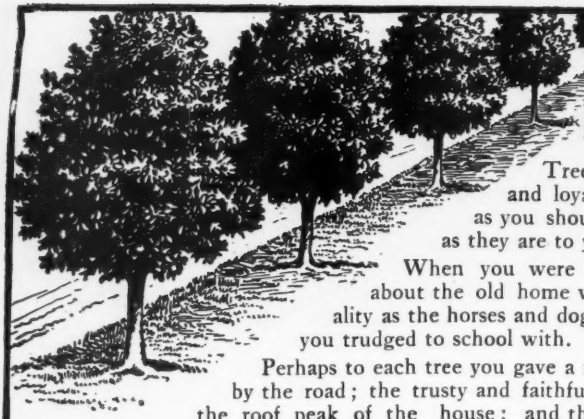
Vol. XV Formerly FORESTRY AND IRRIGATION No. 7

Conservation

Forests, Waters, Soils and Minerals

JULY 1909

Published by THE AMERICAN FORESTRY ASSOCIATION, 1417 G St. N. W., Washington, D. C.
Price, $2.00 per Year, Including Annual Membership in the Association
Copyright, 1909, by The American Forestry Association



Your Trees Have Life and Deserve to Live

Trees are almost human, staunch and loyal, but do you appreciate them as you should? Are you as loyal to them as they are to you?

When you were a child, doubtless every tree about the old home was as much a thing of personality as the horses and dogs you loved—the boys and girls you trudged to school with.

Perhaps to each tree you gave a name—the sturdy old oak close by the road; the trusty and faithful elm that towered high above the roof peak of the house; and the weeping willow in a fence corner close by the driveway.

Possibly you were told the legend of mother's mother, who, when but a girl in her teens, returned one day from a ride and threw her whip in the corner—a mere slip of willow she had found that afternoon; how days passed and the slip took root; how years passed and it became the weeping willow that you knew.

Still other years have passed and the struggles of life have caused you to forget, maybe, the tree friends of your childhood. The old oak was wounded, had not proper care, and died. A mighty storm lacerated the mammoth elm; it was neglected, and today is a mere wreck of its former self. Only a dying trunk stands to remind you of the legend of the weeping willow.

The lives of these trees might have been preserved had you not forgotten to love and care for them as you did of old All the trees are your friends—entities, indeed; worthy of every token of tenderness and every care you can bestow upon them. They cannot complain to you, and today they may appear healthy, while dying within.

John Davey's lifework has been the care of trees, their treatment when sick, their treatment when wounded, their protection from destroying enemies. The Davey methods are sure ones—the result of nearly fifty years' practical experience with trees. No matter what ails your trees, if not too far gone, the Davey experts can save them.

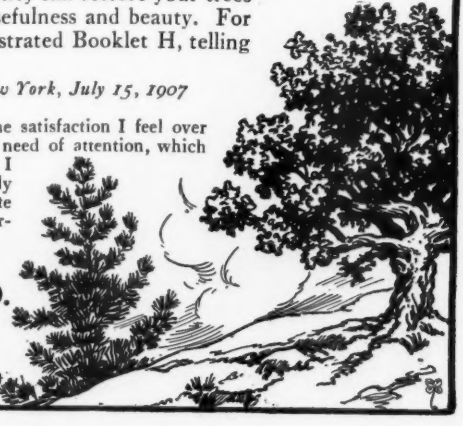
The Davey School of Practical Forestry, at Kent, Ohio, is the culmination of John Davey's great efforts for the recognition of the life and needs of trees. Its corps of highly trained experts are at your service—they can restore your trees to a condition that means years of added usefulness and beauty. For the asking, you can have our handsome illustrated Booklet H, telling you all about the Davey methods.

26 Broadway, New York, July 15, 1907

MR. JOHN DAVEY, Tarrytown, New York.

My Dear Sir: It gives me pleasure to express the satisfaction I feel over the work done on my trees at Tarrytown. Their need of attention, which you plainly indicated, was a revelation to me, and I feel that your work was thoroughly and efficiently done, and will serve not only to beautify but perpetuate the lives of the trees. I beg also to certify to the courtesy and industrious character of your employees.

Very truly yours, JOHN D. ARCHBOLD



THE DAVEY TREE EXPERT CO.

Operating Davey's School of Practical Forestry

Main Office **KENT, OHIO** "The Home of Tree Surgery"

Eastern Office **TARRYTOWN, N. Y.** Address nearest office

Brownley's
MEXICAN PECAN-OKAS
(REGISTERED IN U.S. PATENT OFFICE)
FRESH EVERY HOUR
WASHINGTON, D.C.
1203-5 G STREET

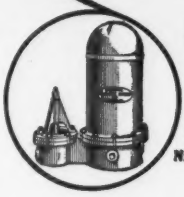
We will send you a two-pound box of our Bon Bons, Chocolates and French Fruits, "the finest in the world," all charges prepaid, for one dollar and fifty cents. We will send you a box of
MEXICAN PECAN-OKAS CANDY
(nearly 2 pounds) anywhere in the world, all charges prepaid, for a dollar bill mailed at our risk.

BROWNLEY'S, Dept. K, 1203-5 G St. Washington, D. C., U. S. A.

Send for Our New Booklet—It's Free

A Wonderful Automatic Pump

Supplying water for country homes is now an easy matter, and the expense is not very great. If there's a stream or spring on your land install a



NIAGARA
Hydraulic Ram

and it will pump the water just where you want it. Better than a windmill or gasoline engine, because it doesn't get out of order and requires no attention. Write for booklet B and estimate. We furnish Caldwell Tanks and Towers.

Niagara Hydraulic Engine Co.,
140 Nassau St., New York
Factory, Chester Pa

FORESTRY SCHOOLS can find no better medium through which to make their announcements than
CONSERVATION

It reaches a class of readers that is reached by no other publication.
It is *the* Magazine of authority in its special field.
For Advertising Rates, etc., address
Advertising Manager CONSERVATION 1417 G Street N. W.
Room C Washington, D. C.

DEPARTMENT OF FORESTRY

The
Pennsylvania State College

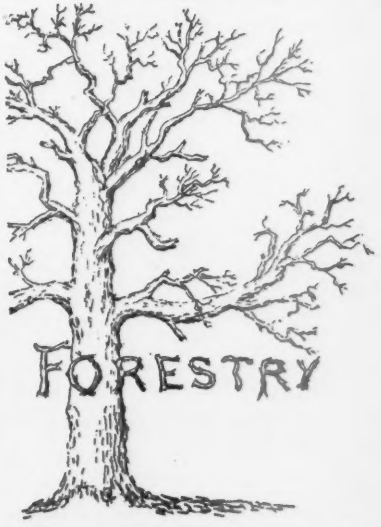
A THOROUGH undergraduate course in technical forestry, preparing men for all lines of professional and applied forestry.

Special attention is given to practical field work in forest measurements, forest nursery work and the management of timber lands. Within four miles there is a State Forest Reserve of several thousand acres upon which the College has the privilege of carrying on study and demonstration in forestry. This gives unexcelled facility for practical work in connection with College work of high grade.

For information regarding entrance requirements, expenses, etc., address

DEPARTMENT OF FORESTRY
State College, Pa.

POWDER POINT SCHOOL, Duxbury, Mass.
Preparatory Course in



Leading to Biltmore and College Courses in the Subject.
SUMMER CLASS opens July 6. Also TUTORING in mathematics, etc.
F. B. Knapp, S. B. (M. I. T.)

For Sale by CONSERVATION, 1417 G Street N. W., Washington, D. C.

IMPORTANT BOOKS ON FORESTRY

PRINCIPLES AND PRACTICE OF FORESTRY

FOREST MENSURATION. By HENRY SOLON GRAVES, M.A. A complete text book of this important subject and the first written for American Foresters. It deals with the determination of the volume of log, tree, or stand, and with the study of increments and yields. *Price, $4.00*

ECONOMICS OF FORESTRY, THE. By B. E. FERNOW. This volume treats of forests and forestry from the standpoint of political economy, and is designed to furnish a trustworthy basis for formulating public policy. *Price, $1.50*

FIRST BOOK OF FORESTRY, A. By FILIBERT ROTH. An outline of the general principles of forestry, written in simple, non-technical language, designed particularly for the beginner. *Price, $1.10*

PRACTICAL FORESTRY, FOR BEGINNERS IN FORESTRY, AGRICULTURAL STUDENTS, AND WOODLAND OWNERS. By JOHN GIFFORD. A good general description of the principles of forestry with enough technical information to prepare the beginner. *Price, $1.40*

HISTORY OF THE LUMBER INDUSTRY OF AMERICA. By J. E. DEFEBAUGH. The first authoritative work of its kind yet issued, and one which will commend itself alike to the timber owner, lumberman, lumber manufacturer, or merchant, or student of economics. In four volumes bound in half leather. *$5.00 per volume*

FOREST PLANTING. By H. NICHOLAS JARCHOW. An illustrated treatise on methods and means of restoring denuded woodland. *Price, $1.50*

FORESTRY. (Schwappach.) An English translation of "Forstwissenschaft." *Price, 70c*

HEDGES, WINDBREAKS, SHELTERS, AND LIVE FENCES. By E. P. POWELL. A treatise on the planting, growth and management of hedges with information concerning windbreaks and shelters. *Price, 70c*

NORTH AMERICAN FORESTS AND FORESTRY. By ERNEST BRUNCKEN. This volume, expository in its character, is written in a style intended for the general reader, to whom it should convey a good idea of our forests forestry. *Price, $2.00*

PRACTICAL FORESTRY. By ANDREW S. FULLER. A treatise on the propagation, planting and cultivation, with descriptions and the botanical and popular names of all the indigenous trees of the United States, and notes on a large number of the most valuable exotic species. *Price, $1.50*

PRINCIPLES OF AMERICAN FORESTRY. By SAMUEL B. GREEN. Prepared especially for students in elementary forestry and for the general reader who wishes to secure a general idea of forestry in North America. *Price, $1.50*

SEASIDE PLANTING OF TREES AND SHRUBS. By ALFRED GAUT. Illustrated from photographs by FRANK SUTCLIFFE. This is a new volume in the English Country Life Library. Advice regarding selection and management to get satisfactory effects under adverse influence of closeness to seashore. *Price, $1.75*

FOREST MANAGEMENT. By C. A. SCHENCK. Describes methods here and abroad to bring the most profit from all investments made in woodlands. *Price, $1.25*

FOREST MENSURATION. By C. A. SCHENCK. Treats conditions in U. S. from mathematical and practical standpoint. *Price, $1.25*

FOREST UTILIZATION. By C. A. SCHENCK. First treatise on this in U. S. Covers logging, lumbering, sawmilling, cooperage, paper-making, and description of all industries obtaining raw material from American forests. *Price, $1.25*

BILTMORE LECTURES ON SYLVICULTURE. By C. A. SCHENCK. Written from author's long experience as forester of the Biltmore estate, where sylviculture has been practiced on a larger scale for a longer time than anywhere else in U. S., and where results become more apparent from year to year. *Price, $2.50*

FOREST FINANCE. By C. A. SCHENCK. Treats of the financial side of forestry, dealing with the scientific and practical development of forest finance, viewing forestry as an investment. *Price, $1.25*

PROFESSION OF FORESTRY, THE. By GIFFORD PINCHOT. A pamphlet containing an address on that subject by Mr. Gifford Pinchot; also an address by Mr. Overton W. Price, on "Study in Europe for American Forest Students," and a list of reference publications for students. *Price, 25c*

FOREIGN IMPORTATIONS

ENGLISH ESTATE FORESTRY. By A. C. FORBES. An authoritative volume on English forest methods from the pen of a well known forester, that should prove of interest to Americans. *Price, $3.50*

FORSTWISSENSCHAFT. (Schwappach.) *Price, 60c*

MANUAL OF FORESTRY. (Schlich.) Five volumes, complete, or separately, as follows (*price, complete, $18.80*);

Vol. I. "FORESTRY POLICY IN THE BRITISH EMPIRE." *Price, $3.40*
Vol. II. "SYLVICULTURE." *Price, $3.20*
Vol. III. "FOREST MANAGEMENT." *Price, $3.60*
Vol. IV. "FOREST PROTECTION." *Price, $4.80*
Vol. V. "FOREST UTILIZATION." *Price, $4.80*

This is perhaps the most authoritative work that has been issued on the technical side of forestry, translated from the German.

WOOD. By G. S. BOULGER. An important new book for arboriculturists and forestry students. A manual of the natural history and industrial applications of the timbers of commerce. Cloth. 82 Illustrations. *Price, 4*

FAMILIAR TREES. By Prof. G. S. BOULGER. Written by an eminent botanical authority, yet couched in language easily understood. The coloured plates are the work of celebrated artists, and are truthful and trustworthy in every respect. A special feature is the series of photo-micrographic illustrations of sections of woods. Three volumes. *Price, per volume, $1.50*

DENDROLOGY, BOTANY, AND IDENTIFICATION OF SPECIES

MANUAL OF THE TREES OF NORTH AMERICA (exclusive of Mexico). By CHARLES SPRAGUE SARGENT. A volume that presents in convenient form and with excellent illustrations, authoritative information concerning the trees of North America. It is written in a manner that enables the reader to readily find to what family or species any particular tree belongs. *Price, $6.00*

AMERICAN WOODS. By ROMEYN B. HOUGH. A new departure in the publication of an authoritative work illustrated with actual wood sections of the various species described. Three are given of each, viz.: radial, transverse, and tangential. Issued in ten parts, per part *Price, $5.00*

HANDBOOK OF THE TREES OF THE NORTHERN U. S. AND CANADA, EAST OF THE ROCKY MOUNTAINS. By ROMEYN B. HOUGH. Pictorial description ·sɔɯ jo Two pages to each species; photo-engravings of trunk, leaves, flowers or fruit, section of wood, and map of distribution, with botanical description, and brief other information.

Price, in buckram, $8.00; in half morocco, $10.00

FLORA OF THE SOUTHERN STATES. CHAPMAN. This is an excellent key to the flora of the South, complete and accurate in its scope. *Price, $4.00*

GETTING ACQUAINTED WITH THE TREES. By J. HORACE MCFARLAND. A handsome volume, copiously illustrated, and with facts accurately presented in an entertaining way. *Price, $1.75*

HOW PLANTS GROW. By ASA GRAY. An understanding of the way in which a tree grows is of prime importance to the forester, and the matter here presented is accurate and authoritative. *Price, $1.00*

PRINCIPAL SPECIES OF WOOD; THEIR CHARACTERICTIC PROPERTIES. By CHARLES HENRY SNOW. No attempt is made to give exhaustive descriptions of species, but the author presents a mass of information designed for the use and instruction of woodworkers, etc., in a popular style. A host of concise information is brought under each head, and the work is a valuable one. *Price, $3.50*

These books sent prepaid upon receipt of price indicated, by CONSERVATION
1417 G Street N. W. Washington, D. C.

Important Books on Forestry and Irrigation for sale by CONSERVATION
1417 G Street N. W., Washington, D. C.

MANUAL OF BOTANY. By ASA GRAY. A key to the flora of the northeastern states, and the most authoritative publication of its nature.
Price, $1.62; field edition, $2.00

TREES OF NEW ENGLAND. By L. L. DAME and HENRY BROOKS. This book is a small volume which can be easily put in the pocket and carried in the woods, and at the same time is the best guide to the identification of our New England trees of any of the smaller books yet published. *Price, $1.50*

TREES AND SHRUBS. By C. S. SARGENT. The most thorough and authoritative publication yet issued, and a standard work. The matter is issued in parts, of which there are three already published. *Price, per part, $5.00*

TREES, SHRUBS, AND VINES OF THE NORTHEASTERN UNITED STATES. By H. E. PARKHURST. In this book the author describes the trees, shrubs, and vines of the northeastern United States in a popular way, the book being designed especially for persons who have never studied botany. To these it will appeal as a valuable guide to a familiarity with the salient characteristics of trees, shrubs, and vines. *Price, $1.50*

TREES. A handbook of forest botany for the woodlands and the laboratory. By H. MARSHALL WARD. Vol. I, Buds and twigs. Vol. II, Leaves. Vol. III, Flowers and inflorescences. Three volumes to be added, on Fruits and seeds, Seedlings, Habit and conformation of the tree as a whole. *Price, per volume, $1.50*

PARTICULAR SPECIES AND LOCALITIES

MOUNTAINS OF CALIFORNIA, THE. By JOHN MUIR. No other person is so well fitted to write of the mountains of California as John Muir, and the volume presented here describes not only the mountains themselves, but the trees that clothe them and the wild life which they harbor. *Price, $1.85*

OUR NATIONAL PARKS. By JOHN MUIR. If you want to learn about the glaciers, mountain peaks, canyons, and great waterfalls of the West; of the habits of animals from the squirrel to the moose; plant life from the big trees to the wild flowers—in fact be brought face to face with nature's works, this is the book.
Price, $1.85

TREES AND SHRUBS OF MASSACHUSETTS. EMERSON. Two volumes. Plain cloth edition has 148 plates. The colored edition has 36 of these in colors.
Price, plain, $12.00 Price, colored, $18.00

THE EARTH AS MODIFIED BY HUMAN ACTION. By G. P. MARSH. A Revision of Man and Nature. Describes changes in the face of the earth caused by man, including desolation of various countries, once thickly inhabited, by removal of forests. Shows importance of maintaining natural balance of forces. *Price, $3.50*

THE LONGLEAF PINE IN VIRGIN FOREST. A Silvical Study. By G. FREDERICK SCHWARZ. This is a study of the life history of this important forest tree. Intended primarily for foresters and forest students; also for owners and managers of pine timber lands. Deals with the preference or dislike of the species for particular conditions of soil, climate, and environment. Illustrations and six tables. *Price, $1.25*

THE SPROUT FORESTS OF THE HOUSATONIC VALLEY TO CONNECTICUT. By G. F. SCHWARZ. Illustrated study of forests repeatedly cut over. *Price, 35c*

IMPORTATIONS

BEAUTIFUL RARE TREES AND PLANTS. By the EARL OF ANNESLEY. A description of some of the rarer English trees, shrubs, and vines, illustrated copiously.
Price, $12.00

FORESTS OF UPPER INDIA AND THEIR INHABITANTS. By THOMAS W. WEBBER. This volume is an account of the author's life in India during the period shortly after 1857. It contains a vivid description of the country, its people, customs, etc., with some description of its forests and timber wealth. *Price, $5.00*

BOOKS ON IRRIGATION AND DRAINAGE

IRRIGATION IN THE UNITED STATES. By F. H. NEWELL. The most authoritative and complete work on the subject which has yet been published, by the head of the Government's irrigation work. *Price, $2.00*

IRRIGATION FARMING. By L. M. WILCOX. A newly revised edition of one of the standard works on irrigation. The principal chapters treat very fully of irrigation, its application, etc., and the volume is profusely illustrated. *Cloth, $2.00*

IRRIGATION FOR FARM, GARDEN AND ORCHARD. By HENRY STEWART. This work is offered to those American farmers and other cultivators of the soil who, from painful experience, can readily appreciate the losses which result from the scarcity of water at critical periods. *Price, $1.00*

IRRIGATION AND DRAINAGE. By F. H. KING. While most of the existing books on these subjects have been written from engineering or legal standpoints, this one presents in a broad, yet specific way the fundamental principles which underlie the methods of culture by irrigation and drainage. *Price, $1.50*

IRRIGATION INSTITUTIONS. By ELWOOD MEAD. A discussion of the economic and legal questions created by the growth of irrigated agriculture in the West, by the Chief of Irrigation and Drainage Investigations of the Department of Agriculture. *Price, $1.25*

LAND DRAINAGE. By MANLY MILES. A handbook for farmers on the principles and practise of draining, giving the results of his extended experience in laying tile drains. *Price, $1.00*

LAND OF LITTLE RAIN, THE. By MRS. MARY AUSTIN. A nature book of the highest type. The volume is made up of a series of sketches of the human, animal, and plant life found in the region of the Mohave desert, Death Valley, and the Sierras, much of which the average person is likely to consider almost devoid of living things. *Price, $2.00*

IRRIGATION ENGINEERING AND CONSTRUCTIVE WORK

DESIGN AND CONSTRUCTION OF DAMS. By EDWARD WEGMANN. This volume includes an authoritative discussion of the constructive work involved and the principal forms of construction. Masonry, rock-fill, and timber dams are discussed extensively. *Price, $6.00*

IMPROVEMENT OF RIVERS. By B. F. THOMAS and D. A. WATT. This volume is a treatise on the methods employed for improving streams for open navigation and for navigation by means of locks and dams.
Price, $6.50

IRRIGATION ENGINEERING. By HERBERT M. WILSON. This is the fourth edition of Mr. Wilson's popular work, and the revision and enlargement which it has undergone, places it at the forefront of text books on the subject for American students. *Price, $4.00*

ENGINEERING FOR LAND DRAINAGE. By C. G. ELLIOTT. A manual for laying out and constructing drains for the improvement of agricultural lands. *Price, $1.50*

RESERVOIRS FOR IRRIGATION, WATERPOWER, AND DOMESTIC WATER-SUPPLY. By JAMES DIX SCHUYLER. An account of various types of dams and the methods and plans of their construction, together with a discussion of the available water-supply for irrigation in various sections of arid America, distribution, application, and use of water; the rainfall, runoff, and evaporation from reservoirs, and effect of silt, etc. *Price, $5.00*

WATER SUPPLY ENGINEERING. By A. PRESCOTT FOLWELL. A treatise on the designing, construction and maintenance of water-supply systems, both city and irrigation. *Price, $4.00*

These books sent prepaid upon receipt of price indicated, by CONSERVATION
1417 G Street N. W., Washington, D. C.

WATER POWER. By JOSEPH P. FRIZELL. An outline of the development and application of the energy of flowing water. *Price, $5.00*

CONCRETE, PLAIN AND REINFORCED. By FREDERICK W. TAYLOR and SANFORD E. THOMPSON. Designed for practicing engineers and contractors; text and reference book for students. Discusses materials, processes, and applications of concrete in construction and specifications. *Price, $5.00*

HYDRAULICS. By MANSFIELD MERRIMAN. Purpose of book is to keep abreast of modern progress, and present subject with conciseness and clearness. Gives general principles and discusses flow of water through various kinds of openings and channels. Historical notes and references. *Price, $5.00*

FOUNDATIONS. By W. M. PATTON. A practical treatise explaining fully the principles involved. Numerous descriptions of important modern structures are given in sufficient detail. Includes articles on use of concrete in foundations. *Price, $5.00*

MASONRY CONSTRUCTION. By IRA O. BAKER. Contains results of a great number of experiments, and a large amount of practical data on cost of masonry, pile driving, foundations, culverts, etc., and 97 tables to facilitate estimating. *Price, $5.00*

REINFORCED CONCRETE. By ALBERT W. BUEL and CHARLES S. HILL. A treatise for designing and constructing engineers, governed by American practice and conditions. Theoretical discussions omitted, and replaced by practical working formulas, examples of representative structures, and records of practice. *Price, $5.00*

BOOKS ON RELATED SUBJECTS

UTILIZATION OF WOOD WASTE BY DISTILLATION. By WALTER B. HARPER. An important treatise on a subject regarding which the interest is great and the information scarce. Is intended to aid in the establishment and conduct of wood distilling enterprises on a business basis. *Price, $3.00*

HANDBOOK OF TIMBER PRESERVATION. By SAMUEL M. ROWE. Intended as a complete practical guide for the operator of a preservation plant, with hints on construction thereof. *Price, $4.00*

IN FOREST LAND. By DOUGLAS MALLOCH. The humor, sentiment, and philosophy of the lumber business interpreted by the "Lumberman Poet." A kind of touch with the great outdoors that few books contain. Illustrated in tint, bound in silk cloth and gold stamped. Ideal for gift or library. *Price, $1.25*

THE GARDEN

ROSES AND HOW TO GROW THEM. By many Experts. In text, practical; in subject and quality of illustrations, beautiful. *Price, $1.20*

FERNS AND HOW TO GROW THEM. By G. A. WOOLSON. The growing of hardy ferns, both in the garden and indoors. *Price, $1.20*

LAWNS AND HOW TO MAKE THEM. By LEONARD BARRON. For the first time the subject of lawn seed mixtures is set forth and explained. 32 photographs. *Price, $1.20*

HOW TO MAKE SCHOOL GARDENS. By H. D. HEMENWAY. This suggestive little book is a practical manual of school gardening for both teacher and pupil, and supplies the first adequate work of the sort in this country. There are to-day a hundred thousand school gardens in Europe, and the progress of the recent movement in America has been most rapid. This volume is based on actual experience (the author is an authority and director of the Hartford School of Horticulture). Illustrations, 10. *Price, $1.10*

HOW TO MAKE A FRUIT GARDEN. By. S. W. FLETCHER. An eminently practical work on the subject of fruits for the home. With 182 photographic illustrations by the author. *Price, $2.25*

HOW TO MAKE A FLOWER GARDEN. A charming and a practical book by experts on every branch of the subject. More than 200 beautiful photographs. *Price, $1.75*

HOW TO MAKE A VEGETABLE GARDEN. By EDITH L. FULLERTON. The only adequate book on the home vegetable garden. 250 photographs by H. B. Fullerton. *Price, $2.20*

ART AND CRAFT OF GARDEN MAKING. By THOMAS H. MAWSON. Third edition of this standard; out of print for a year, and now reissued in revised form. Over 100 plans and details of gardens. Methods employed by successful designers carefully analysed. Characteristic sites in typical districts described and pictured. *Price, $15.00*

THE HOME AND FARM

THE COUNTRY HOUSE. By CHARLES EDW. HOOPER. A Practical manual of house building, absolutely invaluable to every one with a country place. It covers every branch of the subject in detail and treats of the garden and its furnishings in connection with the dwelling. 380 photographs and plans. *Price, $3.50*

THREE ACRES AND LIBERTY. By BOLTON HALL. Description of what can be accomplished on a small place in the way of gardening, home-making, and addition to financial resources. Were it not for the unimpeachable authorities quoted, its statements as to the possibilities of the "Little Lands" for a living would seem fanciful. *Price, $1.85*

THE MAKING OF A COUNTRY HOME. By J. P. MOWBRAY ("J. P. M."). This delightful story showed its universal appeal when published serially, and the volume amply carries out the intention of the author. Besides its practical interest for the thousands of city dwellers who have dreamed of having a country home, the story is one of such reality, humor, and interest as to ensure it the widest circulation in book form. Elaborately decorated. $1.65

THE FIRST BOOK OF FARMING. By CHARLES L. GOODRICH. No one interested in farming, old or young, can fail to appreciate this book, for it really gives the fundamental knowledge of how to conduct a farm with the least expense and the largest return. There are 63 full pages of helpful illustrations. The price is extremely low for a work of such value. 63 pages of photographs. *Price, $1.10*

NATURE BOOKS

AMERICAN FOOD AND GAME FISHES. By DAVID STARR JORDAN and B. W. EVERMANN. Fills a long-felt need in popular scientific works, being a full account of the life-histories and methods of capture of North American food and game fishes. The only book in existence which will enable the amateur readily to identify species new to him. With 10 lithographed color plates, 100 photographs of live fish in the water, and 200 text cuts. *Price, $4.40*

NATURE BIOGRAPHIES. By CLARENCE M. WEED. This volume is a sort of personal acquaintance with the lives of the more common butterflies, moths, grasshoppers, flies, and so on, the sort of fascinating details of these insect existences which make the reader want to go out and study these every-day marvels for himself. 150 photographic illustrations. *Price, $1.50*

THE BROOK BOOK. By MARY ROGERS MILLER. A brook is one of the most living and companionable features of the landscape, and few people, even the most ardent nature lovers, realize what an endlessly interesting study its changes and its throbbing life afford. It is a fascinating subject which the author (well known as a teacher, lecturer, and writer connected with the Nature Study Bureau at Cornell) handles with much ability. 16 photographs. *Price, $1.50*

OUTDOORS. A Book of the Woods, Fields, and Marshlands. By ERNEST MCGAFFEY. Papers on out of doors, showing a love of nature and keenness of observation and power and beauty of description rarely surpassed. *Price, $1.25*

NATURE AND THE CAMERA. By A. RADCLYFFE DUGMORE. Mr. Dugmore is an expert in the new movement of photographing live birds, animals, fish, flowers, etc. His works brought him so many requests for information, that he has set down here a full and detailed account of his methods. From the choice of a camera to questions of lighting, and to the problem of "snapping" shy birds and animals in their native haunts, every step is explained so simply as to be easily comprehended, even by the beginner. 53 photographic illustrations. *Price, $1.50*

SCHOOLS OF FORESTRY

In the heart of the Reserve Region

Colorado School of Forestry

Four years' course in Theoretical and Applied Forestry leading to Degree of Forest Engineer

Winter Term at Colorado College, Colorado Springs. Summer Term at Manitou Park, the School Reserve, 13,000 acres of pine and spruce timberland on the borders of the Pike National Forest

Tuition Sixty Dollars a Year

For further particulars apply to

WM. C. STURGIS, Dean

Colorado Springs, Colo.

Biltmore Forest School

Biltmore, N. C.

Theoretical and practical instruction in all branches of applied forestry.

The course comprises eighteen months; twelve consecutive months of lectures and field work, and six months of practical experience.

Object lessons within the mountain estate of George W. Vanderbilt, comprising 120,000 acres, where forestry has been practiced since 1895.

For further information apply to

C. A. SCHENCK, Director

YALE FOREST SCHOOL

NEW HAVEN, CONNECTICUT

The course of study in the YALE FOREST SCHOOL covers a period of two years. Graduates of collegiate institutions of high standing are admitted as candidates for the degree of Master of Forestry.

The Summer School of Forestry is conducted at MILFORD, PIKE COUNTY, PENNA.

FOR FURTHER INFORMATION ADDRESS

HENRY S. GRAVES, Director

New Haven Connecticut

The American Forestry Association

OFFICERS FOR 1909

PRESIDENT

CURTIS GUILD, Jr., Massachusetts

VICE-PRESIDENTS-AT-LARGE

N. J. BACHELDER, New Hampshire
ANDREW CARNEGIE, New York
CHARLES W. ELIOT, Massachusetts
B. E. FERNOW, Ontario, Canada
W. W. FINLEY, Washington, D. C.
DAVID R. FRANCIS, Missouri
EDWARD EVERETT HALE, Massachusetts
RUTHERFORD P. HAYES, North Carolina
JAMES J. HILL, Minnesota
S. WEIR MITCHELL, Pennsylvania
GEORGE T. OLIVER, Pennsylvania
GEORGE C. PARDEE, California
GEORGE FOSTER PEABODY, New York
J. E. RANSDELL, Louisiana
J. T. ROTHROCK, Pennsylvania
ALBERT SHAW, New York
CHARLES P. TAFT, Ohio
CHARLES R. VAN HISE, Wisconsin
ANDREW D. WHITE, New York

SECRETARY AND TREASURER, OTTO LUEBKERT, Washington, D. C.

DIRECTORS

PHILIP W. AYRES, New Hampshire
JOSHUA L. BAILEY, Pennsylvania
JAMES H. CUTLER, Massachusetts
HENRY S. GRAVES, Connecticut
CURTIS GUILD, JR., Massachusetts
WILLIAM S. HARVEY, Pennsylvania
GEO. D. MARKHAM, Missouri
GEORGE H. MAXWELL, Illinois
CHARLES F. NESBIT, District of Columbia
HENRY A. PRESSEY, District of Columbia
HENRY RIESENBERG, Indiana
CUNO H. RUDOLPH, District of Columbia
EDWIN A. START, Massachusetts
JAMES S. WHIPPLE, New York
GEORGE P. WHITTLESEY, District of Columbia

Advisory Board, Representing Affiliated Organizations

YELLOW PINE MANUFACTURERS' ASSOCIATION

PHILIP S. GARDINER, Laurel, Miss.
N. W. McLEOD, St. Louis, Mo.
H. H. WHELESS, Shreveport, La.

NATIONAL WHOLESALE LUMBER DEALERS' ASSOCIATION

GEORGE F. CRAIG, Philadelphia, Pa.
ROBT. C. LIPPIN TT, Philadelphia, Pa.
LEWIS DILL, Baltimore, Md.

NORTHERN PINE MANUFACTURERS' ASSOCIATION

C. A. SMITH, Minneapolis, Minn.
WILLIAM IRVINE, Chippewa Falls, Wis.
F. E. WEYERHAEUSER, St. Paul, Minn.

MASSACHUSETTS FORESTRY ASSOCIATION

JAMES S. RUSSELL, Boston, Mass.
GEORGE E. STONE, Amherst, Mass
EDWIN A. START, Boston, Mass.

LUMBERMEN'S EXCHANGE

WILLIAM L. RICE, Philadelphia, Pa.
FREDERICK S. UNDERHILL, Philadelphia, Pa.
SAMUEL B. VROOMAN, Philadelphia, Pa.

TIGHT BARREL STAVE MANUFACTURERS' ASSOCIATION

GEORGE M. HAMPTON, Fordyce, Ark.
W. K. KNOX, New York City
A. L. HAYES, Nashville, Tenn.

NATIONAL SLACK COOPERAGE MANUFACTURERS' ASSOCIATION

J. T. WYLIE, Saginaw, Mich.
JAMES INNES, Chatham, Ontario
C. H. KEYS, New York City

NATIONAL ASSOCIATION OF BOX MANUFACTURERS

B. W. PORTER, Greenfield, Mass.
S. B. ANDERSON, Memphis, Tenn.
ROBT. A. JOHNSON, Minneapolis, Minn.

CARRIAGE BUILDERS' NATIONAL ASSOCIATION

H. C. McLEAR, Wilmington, Del.
D. T. WILSON, New York
C. D. FIRESTONE, Columbus, Ohio

BOSTON PAPER TRADE ASSOCIATION

N. M. JONES, Lincoln, Maine
JOHN F. A. HUSSEY, Boston, Mass.
ARTHUR L. HOBSON, Boston, Mass.

Application for Membership

To OTTO LUEBKERT
Secretary American Forestry Association
1417 G Street N. W., Washington, D. C.

Dear Sir: I hereby signify my desire to become a member of the American Forestry Association. Two Dollars ($2.00) for annual dues are enclosed herewith.

Very truly yours,

Name _____

P. O. Address _____

The American Forestry Association

President—CURTIS GUILD, Jr.
Former Governor of Massachusetts

The American Forestry Association was organized in 1882, and incorporated in January, 1897. It now has over 7,000 members, residents of every State in the Union, Canada, and foreign countries. From its organization it has been the tireless friend of the forests.

The object of the Association is to promote the preservation, by wise use, and the extension of the forests of the United States; its means are agitation and education; it seeks to encourage the application of forestry by private owners to forest holdings, large or small; and it favors, especially, the establishment and multiplication of National and State forests, to be administered in the highest interests of all.

The Association seeks as members all who sympathize with its object and methods, and who believe that our natural resources constitute a common heritage, to be used without abusing and administered for the common good. Seeking to conserve our supplies of wood and water, the Association appeals especially to wood-producers and users, including owners of wood lands, lumbermen, foresters, railroad men, and engineers; and to those dependent upon equable stream flow, as manufacturers, irrigators, employers of water power, and those engaged in internal commerce.

The Association meets annually in Washington. It publishes, monthly, CONSERVATION, the magazine of authority in its special field. The list of contributors to this publication includes practically all persons prominent in forest work in the United States, making it alone worth the cost of Annual Membership in the Association.

The dues, covering a subscription to CONSERVATION, are as follows: Annual—For Annual Members, $2; for Sustaining Members, $25; Total, with exemption from all other payments—for Life Members, $100; for Patrons, $1,000. Of the above amount, $1 is set aside each year to pay the subscription of each member to CONSERVATION.

OTTO LUEBKERT, Secretary,
The American Forestry Association.

Membership in the Association coincides with the calendar year

THE CARE OF FORESTS

HOW MUCH ARE YOUR WOODLANDS PAYING YOU?

Are you making your woodlands pay you a profit? Are you getting the utmost from them? Or are they lying waste—uncared for?

With the price of lumber steadily rising, can you afford to neglect your woods? Especially when they might be yearly adding to your bank account with but little effort and expense on your part.

TREES—A MOST PROFITABLE CROP!

Let us make your forests pay you. Let us show you how to thin them out, how to develop them for the future. The cost of our work will be more than repaid by the sale of the marketable lumber we take out. It will pay you a profit. And you will be assured of a regular profit year after year.

We are scientific foresters. Our directors are graduates of the best schools in the country. We cut just enough to enable the trees left to develop more perfectly—to allow frequent, profitable cutting thereafter. We tell you exactly what your forest is worth, what it needs, and how to multiply its value many times by scientific care and cultivation.

Write us to-day. Ask for our free booklet, "The Care of Trees." Let us explain what we can do—what we have done.

LET US SAVE YOUR HOME TREES

The beautiful trees around your country home need scientific attention. They can't take care of themselves. Deadwood, decay, cavities, insects and fungous growths all ruin the beauty of the trees and finally kill them. Let us examine your trees and see what care they need. Let us save them for you. To-day, address

MUNSON-WHITAKER COMPANY

846 TREMONT BUILDING, BOSTON 1706 FLATIRON BUILDING, NEW YORK
1246 MONADNOCK BUILDING, CHICAGO

BOBBINK & ATKINS'

World's Choicest Nursery Products

Shade Trees

There is a growing tendency by every property owner to plant Shade and Ornamental Trees. We have many acres of trees, in all kinds and sizes.

Old-fashioned Flowers

Our collection is complete. The plants are all field grown and will give results the first season.

If it is the reader's intention to purchase Nursery products, make gardens or plantings of any kind, we would suggest that you ask for our *General Illustrated Catalog, No. 50.*

WE GO EVERYWHERE FOR BUSINESS

The General Supervision of Public Grounds and Private Estates a Specialty.

NURSERYMEN AND FLORISTS

Rutherford, N. J.

BUYERS

OF

TIMBER LANDS,
PULP-WOOD LANDS,
WATER POWERS, ETC.

are invited to make known their wants with fullest particulars.

RALPH HERBERT WAGGONER

309 BROADWAY
NEW YORK

I seek to bring BUYER and OWNER together without intermediaries.

I always have in my hands desirable properties at favorable prices.

CONSERVATION

OFFICIAL MAGAZINE OF THE AMERICAN FORESTRY ASSOCIATION

CONTENTS FOR JULY, 1909

COVER DESIGN—By Charles E. Cartwright.

TYPICAL ORCHARD HOME IN THE INLAND EMPIRE.....*Frontispiece*

IRRIGATION IN THE INLAND EMPIRE..... 385

A FOREST CONFERENCE IN THE WHITE MOUNTAINS..... 391

THE BIG BANYAN OF KEY WEST, FLA.—By Mrs. R. A. Ellis..... 393

A FIELD FOR INVENTIVE GENIUS—By Mrs. Lydia Adams-Williams..... 394

WORK ON A NATIONAL FOREST—No. II, by Charles Howard Shinn..... 397

PRACTICAL FOREST WORK FOR ADVANCED STUDENTS IN NEBRASKA.. 402

FORESTRY IN MASSACHUSETTS—By F. W. Rane..... 405

NATURAL TAXATION OF TIMBERED MINING LAND—By Robt. B. Brinsmade.. 408

WATER CIRCULATION AND ITS CONTROL—By Bailey Willis..... 413

CHEMISTRY AND CONSERVATION..... 422

THE PRESIDENT FOR CONSERVATION..... 426

ORGANIZATIONS FAVORING APPALACHIAN NATIONAL FORESTS..... 427

EDITORIAL—

Edward Everett Hale..... 430
Forestry a Germ of the Conservation Movement.. 430
Let Us Hear from the Schools..... 431
Legislative News Bureau for CONSERVATION.... 431
The Point of View..... 431
Water-power Grabs in Wisconsin..... 432
The National Irrigation Congress..... 434
President Hill on Conservation..... 435
Destruction of Fish..... 437
Responsibility for Forests..... 438

BACK NUMBERS WANTED..... 438

NEWS AND NOTES—

Government to Study Eucalyptus Planting..... 439
Timber Seasoning and Wood Preservation..... 439
Forest Conservation in Germany and the United States..... 439
Mr. Weyerhaeuser on Forest Taxation..... 440
Taxing a Forest Grant..... 440
Government Encouraging Willow Culture..... 441
Seasoning Eucalyptus Poles..... 441
Forest Resources of South America..... 442
Over-cutting of Connecticut's Forests..... 442
Fire Waste Through Carelessness..... 443
Needless Work Is Waste..... 443
Two Projects in Eastern Oregon..... 443
Governors Expected at Irrigation Congress..... 444
Forestry the Schools..... 444
Mr. Pinc on Forestry in Arkansas..... 444
The Moral Aspect of Forestry..... 444
Saving the Big Trees..... 445
A New Pest..... 445
Michigan Forest Fires..... 445
Pursuing Timber Thieves in Michigan..... 445
Forest Work in Virginia..... 445
Afforestation by Newark..... 446
Forestry Work in Vermont..... 446
A Chair of Silviculture at Yale..... 446
Annual Meeting of Connecticut Forestry Association..... 446
Dry Farming..... 447
Natural Resources to Produce Revenue..... 447
Face to Face with a Water-power Trust... 447
The Water-power Monopoly..... 447
Water-power Sites..... 448
A Conservation Commission for Iowa..... 449
Favors a Conservation Commission for Canada.. 449
Conservation of Daylight..... 449
Forest Fires in Maine..... 449
Bark Affects Penetration of Wood Preservatives 449
Government Studying Yellow Pine..... 450
Magazines Pushing Conservation..... 450
Vanishing Forest Giants..... 450
Wood-waste Distillation..... 450

RECENT PUBLICATIONS..... 450

CONSERVATION is the official organ of the American Forestry Association. Price, $2.00 per year, including Annual Membership in the Association. Entered as second-class matter August 1, 1908, at the Post-office at Washington, D. C., under the Act of March 3, 1879

Published Monthly at

1417 G STREET, N. W. WASHINGTON, D. C.

Typical Orchard Home in the Inland Empire Southwest of Spo'ane

Vol. XV JULY, 1909 No. 7

IRRIGATION IN THE INLAND EMPIRE

IRRIGATION by Government projects covering more than 2,000,000 acres of lands in the West, and by private projects covering some 11,000,000; possibilities under intensive cultivation and the advantages of community life in localities where orchards, fields, and gardens are watered by artificial means, and problems of forestry, deep waterways, reclamation of swamp lands, good roads, conservation of resources and home-building, all will be brought prominently to the fore during the seventeenth sessions of the National Irrigation Congress. This meeting will be held in Spokane, August 9 to 14, when between 4,000 and 5,000 accredited delegates and representative business men of the United States and Canada, Europe, the Latin republics, China, and Japan will meet under the presidency of George Eames Barstow of Texas.

The board of control, through its executive committee, headed by R. Insinger, is arranging a comprehensive program, including addresses by statesmen, scientists, bankers, and experts in their various lines of endeavor, and discussions by delegates. In addition, there will be demonstrations by officials of the United States Reclamation Service of the scientific application of moisture. These will take place in the state armory, where the congress meets.

There will also be parades of progress, showing the development of the Northwest, and a march in review by the industrial and irrigation army of 10,000 men, representing the various districts in which intensified farming is practised. The thoroughfares and buildings in the city will be decorated and illuminated by myriads of electric lights, and there will be massed exhibits of the resources of the country, the unfurling of the colors of the nations, patriotic airs by massed bands, the singing of the irrigation ode by a large chorus of trained singers and renditions of national and state hymns by school children.

Though there are now approximately 200 private irrigation projects in what is called the Inland Empire, embracing 150,000 square miles of territory in eastern Washington, northern Idaho, western Montana, northeastern Oregon, and southeastern British Columbia, and

Lower Falls in

scores of private works in other parts of the West, the Government of the United States early recognized the possibilities of the land in the Northwest, where its operations cover more than 1,000,000 acres. More than that, the economic value of irrigation has become so established there is no longer doubt, if any existed, that the West, once called the Great American Desert, is bound to become the home of the highest agricultural civilization of all America.

The largest of the Government's works in the state of Washington is the Sunnyside project, in the Yakima Valley. It covers 99,000 acres, and will cost $2,253,000. The Tieton project, in the same valley, will reclaim 30,000 acres, at a cost of $1,800,000, and the Wapato, also in the Yakima Valley, will eventually take in 120,000 acres at a cost of $3,600,000. The Okanogan project, in the county of the same name, will water 9,000 acres, at a cost of $585,000.

In addition to these, the Government has authorized the Kittitas and Benton projects, covering several hundred thousand acres in Washington. The Indian and Reclamation Service estimate that $25 or less will cover the cost for water right on the reservation. This is about one-half the cost of watering land under other canals in the Yakima Valley. There are also twenty successfully operated private irrigation projects in this valley.

Government officials report that eventually more than $20,000,000 will be expended by the Reclamation Service in the state of Washington in reclaiming 500,000 acres of land now entirely or partly waste. Of this, 50,000 acres will be in the Ellenburg district.

The Government projects in southern Idaho are the Minidoka, with an area of 160,000 acres, to be completed at

the Heart of Spokane

an estimated cost of $4,000,000, and the Payette-Boise, 200,000 acres, costing $3,000,000; while Oregon has the Umatilla project, 20,000 acres, costing $1,200,000; and the Klamath, part of which extends into California, 165,000 acres, costing $5,950,000.

The projects in Montana are the Huntley, 33,000 acres, cost $840,000; the Milk River, including Saint Mary, 30,000 acres, cost $1,200,000, and the Sun River, 16,000 acres, costing $500,000. The Lower Yellowstone project in Montana and North Dakota takes in 66,000 acres, and will cost $2,700,000 when completed.

Two hundred private projects are in operation in the Inland Empire. Numerous irrigation canals have been constructed in Chelan County, which has the Wenatchee, Chelan, and Entiat valleys. There are also important works along the Columbia River in eastern Oregon and in the Spokane, Kettle Falls, Bitter Root, and Snake River and Clearwater valleys. One hundred thousand acres of land in the Spokane Valley is capable of irrigation. The Spokane River, near-by lakes, and an underground stream, flowing through the valley, are used by these plants, one of which raises the water by means of electric pumps from wells, ninety-seven to 140 feet in depth.

The extent of operations on irrigated lands in the Northwest will be better understood when it is known that the value of the apple and other fruit crops in the Inland Empire amounted to $14,000,000 in 1908. It will be $60,000,000 in 1912, by which time several million trees, set out in the last two years, will come into bearing, and others planted between 1903 and 1906 will have reached maturity.

This is only the beginning of the fruit industry in the Northwest, where mil-

Where Dollars Grow on Trees in Irrigated District, Eastern Washington

Part of a Stand of Yellow Pine in Southeastern Washington

Pend Oreille River, Water Used to Irrigate Lands in Calispal Valley, Northeast of Spokane

lions of acres of land, now flecked with the dusty green of sagebrush, are awaiting the refreshing moisture to make it blossom like the proverbial rose. Irrigation does much more for the growing of crops than does rain, as the natural element gives nothing except moisture, while the waters diverted from the mountain sides bring with them new fertility.

Irrigation is no longer an experiment in the western country; it is a confirmed success from commercial and financial viewpoints. It has been demonstrated that under irrigation these lands will produce paying crops of anything which grows in the temperate zone. The products are noted for their brilliant coloring, unusual size, and excellent flavor, and they command the markets of the world. Vegetables in almost endless variety and the choicest vine and tree fruits follow each other in rotation and fill out the season.

Five to ten acres of land in the irrigated districts will provide shelter, food, and raiment for a family and enable its owner to put aside from $500 to $1,000 a year. Scores of hundreds of men and women, many of whom came from the crowded cities, are doing that much or better to-day, and the development of the country, now yet in its infancy, will provide a safety-valve against the impending dangers of congestion in the cities of the East.

A FOREST CONFERENCE IN THE WHITE MOUNTAINS

AUGUST 3, 4, and 5 promise to be interesting days in New Hampshire. In connection with the annual meeting of the Society for the Protection of New Hampshire Forests, beginning on the evening of August 3, and continuing through the 4th, the directors of the American Forestry Association will hold a meeting, and there will be a gathering of the state foresters of the New England and Middle Atlantic states. It has been decided to make the occasion a forest conference, under the auspices of the New Hampshire Society. Hon. Frank W. Rollins, formerly governor of New Hampshire, will preside. Mr. James S. Whipple, forest commissioner of New York State, will give an address, illustrated with lantern photographs, showing what has been done in the great Adirondack and Catskill reserves, especially in reforesting them. Mr. Austin F. Hawes, state forester in Vermont; Mr. F. Wm. Rane, state forester in Massachusetts, and Mr. Edwin A. Start, secretary of the Massachusetts Forestry Association, will take part. Full reports will be made of the progress of the Appalachian Bill. There will be excursions on August 5 to Mt. Washington, Mt. Echo, overlooking the great burned areas in the Zealand Valley, and to other interesting points.

The sessions of the conference will be held at the Mt. Pleasant House, Bretton Woods, N. H., one of the most comfortable and best-appointed hotels in the mountains, and located in the heart of the Presidential Range. A special rate of $3 a day is made to those who come from a distance.

An excursion may be arranged up Hale Mountain, named for Rev. Edward Everett Hale, a large mountain near the center of the White Mountains, but little visited because of its comparative inaccessibility and the absence of any trail. Prior to the unexpected announcement of his death, Doctor Hale himself, it was hoped, would attend the conference in person.

Members of the American Forestry Association who may be sojourning in New England in August will be cordially welcome.

Banyan, or "Wild Fig Tree of India," in Key West. Largest One in the United States

THE BIG BANYAN OF KEY WEST, FLA.

By MRS. R. A. ELLIS

NO NATURAL growth in the United States has attracted more admiring attention from travelers who see it than the big Banyan, or Wild Fig tree, in front of the army post at Key West.

This island-town, the southernmost under our flag, is quaintly interesting in every way; and its avenues, lined with gracefully waving cocoa palms, wide-branching tamarinds, tall sapodilloes, and Cuban laurels, hold visitors in a continuous state of ecstatic admiration as they drive or go by car from end to end of this seventeen-mile-long rock thrown up in the Mexican Gulf.

But when we turn out by the barracks and rest under the shade of this vast spreading Banyan tree, wonderful gift of the Orient to the Occident, silence is the first tribute we pay its beauty and charm.

Here is the fig-tree of the East. The prophet made us acquainted with it when he promised, "Thou shalt rest under thine own vine and fig tree," and in this pleasant shade, deep and wide, we begin to comprehend the significance of such a promise, especially to the sun-weary Eastern peoples.

The name Banyan, attaching to it because such trees were originally used as bazaars or marts by the early Hindu merchants—"banians," in their language, who traded by caravan from the ports to the interior—came long ago to be used popularly, and now we seldom hear another. Yet it is really the fig-tree, the Ficus Bengalensis.

Here is indeed a "forest in a single tree." Slender roots, like feelers, are being continually thrown out from its lateral branches. These speedily find and grasp the soil, and soon are sturdy new trunks, for the stancher support of the ever-expanding crown.

In India, the tree has long been planted extensively for shade, and the Key Westers are now trying experiments with it for the same purpose. It is easy to see how valuable it will prove amid tropic heats, being of comparatively rapid growth and frequently covering a space of 300 feet in diameter, and easily attaining a height of eighty feet. The fruit is merely the size of a cherry, and of little value.

Nature here shows another of her coquettish inconsistencies. Why shouldn't she have fastened her huge, dangerous-looking clusters of cocoanuts among these wide, substantial branches, and hung the light bunches of figs, or cherries, up there in the plumy crown of the swaying palm?

A FIELD FOR INVENTIVE GENIUS

Need of a Substitute for the Wooden Railroad Tie—Description of the Keystone Steel Railroad Tie

By MRS. LYDIA ADAMS-WILLIAMS

OF THE many forms in which wood is used, railroad ties occupy fourth place in the total yearly expenditure, sawed lumber being first, firewood second, and shingles and laths third. It has been calculated that the amount of wood used each year in ties is equivalent to the product of 600,000 acres of forest, and that to maintain every tie in the track two trees must be growing.

In the construction of new track and for renewals, the steam and street railroads used, in 1906, over 100,000,000 cross ties, at an average price of 48 cents per tie, an approximate value of over $48,000,000.

The woods used varied, but oak largely predominated, forty-four per cent., or nearly one-half of the ties consumed, being made of that wood. Southern pines came second, being utilized for about one-sixth of all the ties laid. Other woods used were, in the order of their consumption, Douglas fir, cedar, chestnut, cypress, western pine, tamarack, hemlock, redwood, lodgepole pine, white pine, and others.

This immense yearly drain upon the forests for railroad ties alone, covering a large variety of the principal woods grown, emphasizes the need of inventive genius to discover some substitute for wood.

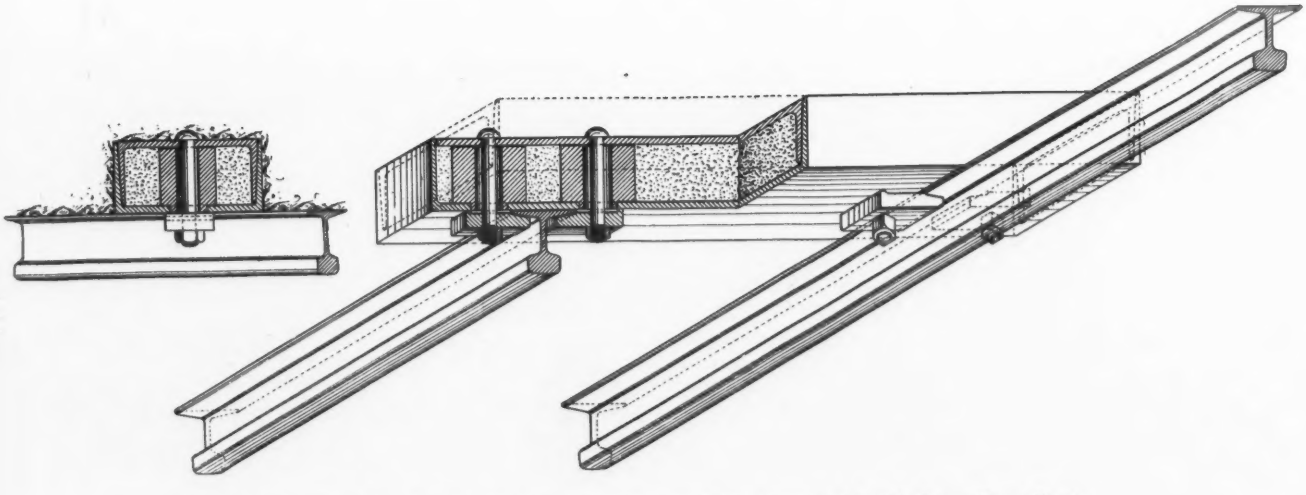
With nearly 300,000 miles of railroad trackage, and approximately 2,800 ties to the mile, there are over 800,000 ties constantly subject to wear and decay. When it is considered that the service of the longest-lived tie timbers in general use—white oak, Douglas fir, chestnut, tamarack, and spruce—is but seven years, while with some, as the black oak, it is but four years; and when it is further considered that the supply of hardwood is waning and that a timber famine is almost at hand, the fact becomes apparent that there is a vital necessity for inventing some tie to take the place of the wooden tie.

Statistics gathered by the Forest Service prove that the timber supplies of the country, at the present rate of consumption, will be exhausted in thirty-three years.

To the unscientific and untraveled person who gazes with admiration almost amounting to reverence upon some particularly fine stand of timber which his limited vacation trip brings to his attention, the widely heralded fact that the timber supplies will soon be exhausted seems a fallacy unworthy of belief.

What do we mean by saying that a timber famine is at hand?

Scattered throughout the United States there are from 500,000,000 to 700,000,000 acres of land, upon which more or less timber is growing. The Forest Service in its estimate of the timber now standing places the highest figure at 2,000,000,000,000 board feet, while the lowest figure of the standing timber is 1,400,000,000,000 board feet. We are cutting and using timber at the rate of 100,000,000,000 board feet a year, while the annual growth is but a third of the consumption or from thirty to forty billion feet. Subtract forty from 100 and we see that we are using each year 60,000,000,000 more board



Steel Railroad Tie, Eight Feet Long, Eight Inches Wide, Five Inches Thick. Patented July 3, 1906. Dawson Hoopes, Patentee

feet than grows each year. Divide 2,000 by sixty and we have an indication that the timber will be exhausted in a little over thirty years—to be exact, in thirty-three and one-third years.

With a timber famine almost at hand, the wood-using industries will welcome any practical invention that will tend to lessen the drain upon the forests. Many substitutes are talked of to take the place of wood, but even with them all we still need to exercise the utmost care and economy in the use of our wood resources.

An invention which will greatly lessen the drain upon the wood supply is a steel railroad tie patented by Mr. Dawson Hoopes, of Philadelphia, and known as the Keystone steel tie.

The tie, which is eight feet long, eight inches wide and five inches thick, has its body formed of two channel-shaped beams of steel, of different cross-sections and one fitting over or embracing the other to constitute a box-like structure, with bolts for clamping the rails thereto. The tie is filled with some non-metallic material, as slag or concrete, which, while in the plastic condition, may be poured in and allowed to set or harden to give solidity to the tie as a whole.

Experiments prove the Keystone steel tie to be eminently satisfactory, and filling in all respects the requirements of the ordinary oak tie, combining, as it does, great strength and stability, and conforming closely to the shape and resiliency of the wooden tie, with the added advantage that its usefulness covers a period ten times as long as does the best wood tie in use.

On account of the shortage of wood pulp, the invention of this tie is welcomed by the wood-using industries and by newspapers. It is predicted that the tie will meet with wide use, especially in the Philippines, China and South America, as the fact that it can be shipped in parts, and assembled and filled with concrete afterward, makes it desirable for transporting a long distance.

A Scene in the Everglades

WORK ON A NATIONAL FOREST

No. 11. The Personal Equation

By CHARLES HOWARD SHINN, Supervisor, Sierra National Forest

IT IS the 1st of May up here in the forest, and all the world is moving on to growth and strength. Everywhere new life has risen like a happy flood. Everywhere the rangers are ready in the same old spirit of unspoiled confidence that they have taught each other, and their supervisor, up here in old Sierra.

Sometimes it has been said to me that those forest men who really understand the secret fashioning of the one central principle which I have ever striven to set forth in these articles do not in the least need the lesson, while on the other hand those who most painfully need it are not conscious of its lack nor capable of its comprehension.

This must be true in some degree of every fact, large or small; the friends of the fact, since time began, have uttered in effect the same criticism. But if one yielded to it, even in thought, it would be a treason like Arnold's. In all men I have ever known there is hidden, though often too deep and silent, enough comprehension to follow the blazed trail, when once they find it.

It is not given to many of us to blaze a trail so well and so wisely that along that broadened path a railroad shall some day run. Very few men in all the ages that have been can rise to the full certitude of Kipling's Pioneer.

Do you remember him? Kipling's name for him is "The Explorer." The poem is in the *Five Nations*. That, and the "Chant Pagan," redeem a thousand times over all the vulgar, trivial, and ignorant things which Kipling has written. Read it again, and rejoice with the pioneer of the pioneers who had set his mark on his land forever, and who said to those who were to build the sites he had chosen,

> Have I named one single river? Have I claimed one single acre?
> Have I kept one single nugget (barring samples)? No; not I.
> *Because my price was paid me ten times over by my Maker.*
> But you wouldn't understand it. You go up and occupy.

Something of this pioneer feeling comes to one every now and then, almost blinding him with its intensity of white fire. It undoubtedly came with immense force and in an especial way to the man whose whole leadership of the new forest movement in America was made possible only because of his "explorer's imagination;" he heard, and still hears, the call of that which "lies hidden behind the ranges."

What is it that binds the hearts of men to a great cause such as forestry, and makes it dearer to them with each revolving year? And what is the one thread that runs through all that I have written or said, these years in the Sierras? It is, I think, the recognition of the infinite preciousness of the "personal equation." I am convinced that we should so deal with all men, and with our fellow-workers, and with those under us and those over us, that the best there is in each one's personal equation (both theirs and ours) shall truly find its fullest development.

The heart of it all is so to live that we can put ourselves in the other fellow's place, see with his eyes, pulse with his heart, think with his brain, sorrow with his errors, and rejoice with his successes, deal with him as a friend and a brother, lift him to new levels

Forest of Noble Fir, Hemlock and Red Fir in Oregon

by putting into his soul a passionate desire for some larger thing. Nor can we ever help another until we learn how to take help from him.

I know a splendid ranger, great and joyous, who once said of his supervisor: "He makes me feel as if I was going to be on trial for my life pretty soon, with just a hair of prejudice against me in the mind of the court." It was said at a camp-fire; it drifted wide, and came to be the final judgment of the mountains. Somehow the "personal equation" had been cast out of the balances, you see, and when that falls to the ground there is very little left.

I heard of a ranger once, who said to his superior officer, "I like this new work of mine so much better than what I used to do."

"Yes," said the officer, "all of us are delighted with your success."

"It was the best thing I ever did, to ask you to change me out of grazing into timber. You know that time you came along under these sugar pines, about midnight, and tumbled into my tent, and we had breakfast by starlight, and we talked of when we were boys, you in Maine and me in California? Then we talked about the work, and I was some worried because people was saying I was doin' things badly (but I never telled you how I felt). Then somehow we began to talk about timber, and it come to me suddenlike that I belonged there."

"I remember all about it, Jim; and I thought then what a good suggestion you had made."

The officer rode away a little later, and as he looked back to the tent, he thought to himself: "How good it is that amongst us we were able to tune that harp without breaking a string; not one is even frayed. It was worth the trouble."

Only the blue-eyed wife of that old officer, who had been a ranger himself, and an inspector and a supervisor and many things besides, knew how slowly, patiently, for weeks on end, he had dropped into that grazing ranger's mind some seeds of the thought that while it was better fun to work in timber, he had really been a pretty decent grazing man, and gained friends for the Service, and was truly making the transfer himself.

"Now, why did you take all that trouble?" she had once asked, a little anxious lest her man should not have enough sleep. "It is the first duty of a subordinate, surely, to do what he is told to do."

"That is true," he replied. "It is dead easy to force an issue. But what we must have is the highest possible loyalty of the man to the Service, paid for not in coin of the realm, but in as absolute a loyalty of the Service to the individual. The Service must never destroy, nor in the slightest degree injure, even for an hour, the honorable self-respect of the least of its faithful servants. If it often does that, the ax is laid at the root of the tree."

"Yes; I know that your *personnel* reports have cost you more thought than all else put together."

"Certainly; for the divine 'personal equation' is the best thing there is in human nature. Yield to it, use it, guide it, until out of each separate temperament you get the pure flame of that unquestioning loyalty that knows itself honored and understood."

"But Jim often did poorly as a grazing ranger, and you never told him so."

"He did the very best he knew how, for several years, openly and eagerly. He did many things so well that the memory of them will long remain. It is a part of my business to carry every honest ranger over such hard places."

"I can hardly understand that."

"Because the Service had justly accepted responsibility for him, on the whole, for several years. It was merely a question of getting him where he could do better work for the Service which he loved utterly. Even if it had been worse, no truly wise official could run the risk of taking away from him all that gave him value—his self-respect."

"But how about his temperamental faults and blunders?"

"All of us have those. There are

Skidding Red Fir in a Washington Forest

times when they may be helped in some degree. For the most part the Service owes to its faithful servants neither praise nor blame, but comprehension."

The officer reached up to his desk and took down a journal. He turned slowly back some six months and found an entry. "There," he said to his wife. "That was my entire report on Jim's case."

It read: "I have seen a good deal of Jim Blank lately. He is a fine, big fellow, with ambitions, and I find that he wants to take up timber work. This will especially suit his make-up, and he goes into it from the bottom, at his own request, for he feels that he is needed there more than in grazing. This case is therefore closed with a good, long credit-mark for Jim, and absolutely nothing official against him."

The officer's wife cried out in dismay: "Dear me! Was *that* all you said? Why, your notes on that case would have made a book. Nobody will ever know what you did for Jim."

"You and I know," said the officer, very soberly, seeing as he spoke a ranger's cabin near a saw-mill; a ranger's wife and baby; the ranger himself, a busy, happy, effective man whose sincere love for the forest had been strengthened by an all-containing leadership.

"Do you remember the story," he asked her, "the story about the Promethean fire? It is said that the Titan who so loved earth stole that fire and brought it across blue spaces in a fennel stalk! Evidently that was not material fire—it was that spiritual flame, a spark of which in each earth-born man makes him one with the gods themselves. Underneath all the differences of temperament, of education, of surroundings, that to which we must ever speak is that spark which Prometheus carried in the fennel stalk and set in all hearts forever."

He put his arm about his wife's waist and they went off into the garden and gathered roses together. And I think he told her more than I have written here, for when they came back tears and laughter were mingled in his eyes, and laughter and tears were in hers.

But after they sat down he said:

"Now, you must remember that this is the way of it: Every single item in a report may be true, and yet the things left out, the unseen facts, the relations of the several parts, the putting together, may all be so wrong that the sum-total becomes absolutely false. You can make a mosaic of precious stones on the very Tomb of the Prophet in sentences that blaspheme the throne of Allah.

"Yes," he continued, more to himself than to her, "we should be able to rejoice in all healthy differences of temperament, in all the divine problems of the personal equation. All good and earnest men know their own shortcomings better than we can tell them; it is enough that we with larger comprehension cheerfully analyze these shortcomings, and as cheerfully accept what cannot be helped.

"There was once one who walked by Gennesaret, and there he found rude fishermen, and somehow changed them into the mighty apostles of a new religion, without changing their temperaments, without stupidly violating any of those higher spiritual laws of a perfect understanding. Therefore, their souls blossomed like roses set in new soil, under new planets."

Again the silence fell between them, as they looked out over mountains and forests.

"There is," he said, "a far greater virtue than mere loyalty, so often, and so lightly on our lips. It gathers all virtues together and explains them to themselves. Not yet has it had a name; no pantheon holds its marble impersonation. And still, since men began to be, their secret prayers have gone forth all unconsciously, age after age, for the gift in even small degree of this crown of all virtues. It is that by which the Master dealt with His fishermen; it is that by which we must deal with our rangers. Its name, in those higher places where it rules, is Comprehension; mercy, truth, justice, imagination, and all the divinities are its advisers—but ever it casts the deciding vote."

PRACTICAL FOREST WORK FOR ADVANCED STUDENTS OF NEBRASKA FOREST SCHOOL

WORK in the forestry courses at the University of Nebraska has recently been augmented to a marked degree. Within the past year the advanced students have been making a field study of forest and lumbering conditions in northern Wisconsin under the direction of Professor Phillips, Assistant State Forester Moody, various cruisers and the owners of several wood-using industries in the region. Mr. Moody is thoroughly acquainted with forest work and has lumbered in Maine and Washington; he has worked for the United States Forest Service in Maine and Colorado and has been Assistant State Forester of Wisconsin for the past three years. Because of Mr. Moody's broad training in both practical and theoretical forestry, his time with the students will be of the highest value.

The region about Rhinelander was selected as being the best suited for the work, as that city has the greatest variety of high-class wood-using industries of any city of its size in the United States. The locality is rich in hardwoods and conifers, is in the center of a great area devastated by the forest fires of the past season, and is also centrally located in the areas held as state forest reserves. It is considered that no better region could be selected in the entire United States for a detailed study of practically all the great phases of lumbering and forestry, and that a month under such favorable conditions is worth at least three times that length of time in a less favorable region. A happy feature of the work has been the enthusiastic attitude of the lumbermen in doing their utmost to supply the students with full information.

The work in the forest was first taken up from the standpoint of forest types, silvical descriptions of the more important species and the value of the forest for protection. A particularly interesting feature was the work being done by the Wisconsin Valley Improvement Company, which is authorized to construct and maintain a system of reservoirs on the tributaries of the Wisconsin River for the purpose of producing a uniform flow of water and thereby conserving and improving the water supply throughout its entire length. This company is doing the greatest work of its kind east of the Rocky Mountains and heartily cooperates with the state forestry officials in retaining the forest cover about the headwaters of streams. This work conveys an interesting object-lesson, since the northern states have been suffering from damaging floods in early spring and a decided shortage of water during the summer months. The Wisconsin River is receiving active attention at the present time because of the large number of important industries depending on its water supply for power. These industries have been confronted by a summer shortage, causing them to limit operations from one to three months at a time. The spring floods of the more important streams of Michigan, Wisconsin and Minnesota alone have caused millions of dollars of damage annually, and such work as is being done by the Wisconsin Valley Improvement Company marks a wonderful step in flood prevention in this region.

Wasteful Lumbering Methods in a Longleaf-pine Forest

Sluiceways of a Splash-dam (Minnesota)

Special attention was paid to the past methods of lumbering as contrasted with the careful forest exploitation of the present. Comparisons were also made as to the relative waste incurred by the various industries and the need of even more conservative utilization than now exists. Northern Wisconsin, in conjunction with the other lake states, has suffered from immense trespass cases in the past and is having a large number of small cases at present. Various areas were inspected where private, state and national trespass had taken place, and instruction was given as to the general methods of procedure in each case. To gain a working knowledge of estimating a stand of timber, the students cruised after an expert and then compared their results with his. The various methods of estimating as used in forestry investigations were performed in the field and compared with cruising methods. Detailed studies were made of the items of cost and the methods employed in each step of the wood operations at the camps of the Robbins and the Brown Brothers lumber companies, while general studies were made at two other camps.

At Rhinelander the students were taken through the paper and pulp mill which uses both the mechanical and the chemical method of manufacturing paper and has a reputation of being unsurpassed in rapidity of production by any mill of its size in the country. Mr. F. S. Robbins, of the Robbins Lumber Company, who did all in his power to make the trip a success, took personal charge of the study in his mills and gave an exact statement of the cost of each operation and the factors influencing it. Mr. Robbins' sawmill has a capacity of 130,000 board feet per day and has in connection a planing mill, dry kiln, flooring plant, interior wood-working plant, shingle mill and lath mill. He utilizes every available species of conifers and hardwoods, and all material which is not used for higher class products is used for cord wood. Similar trips were also taken through a high-class veneer factory and a refrigerator factory. Side trips were taken to a large charcoal and wood alcohol plant and a large combined tannery and sawmill.

The winter trip was planned as a regular feature of the forestry course, designed to supplement the spring trip which was taken to the Dismal River National Forest where extensive plantations of forest trees are made in the sand hills of Nebraska. The students also visit local nurseries and forest plantations. Still better training is planned by requiring each student to spend one full summer vacation in the forest, which is aimed to give a more complete training than could possibly be given in a field course in forestry. To improve the teaching facilities in forestry the space assigned to the forestry department at the university has been increased more than five-fold and the equipment has been increased tenfold. Besides the five professors who teach technical forestry subjects several special lecturers have been secured to give courses of five to fifteen lectures each along the lines of forestry in which they are authorities.

Brown Lake Reservoir Site Washington

FORESTRY IN MASSACHUSETTS

By F. W. RANE, State Forester

IT IS with a degree of pleasure that I am able to report that our Massachusetts people have been very considerate of the recommendations of their state forester during the past few years, and that the people generally of the good old Bay State are offering cordial and hearty cooperation toward establishing a definite constructive and practical forest policy.

One of the greatest hindrances the writer had to contend with in beginning his work in this state was forest fires. Here, as elsewhere throughout the Union, this demon was running rampant. A campaign was begun in the fall of 1906, and during the winter following the legislature enacted our present state and town forest warden system.

The Massachusetts forest warden system is headed by the state forester. Each board of selectmen of the towns is required to appoint a forest warden who, in turn, must be approved by the state forester. Each warden is therefore responsible to both the state and town. The forest warden has the authority to appoint his own deputies and to discharge them. He is clothed with sufficient power to represent the town's forest interests. The state forester requests that the selectmen appoint a public-spirited and broad-minded person for this office. This law is already in effect, and from one year's experience the results accomplished have exceeded expectations. With a corps of 350 forest wardens (one in each town and city) each with an organized working force of deputies and sympathetic, public-spirited backing, the state forester has an army of men thoroughly enlisted in bettering our Bay State forestry conditions. As a result of this organization more valuable data were received relative to forestry matters during the past year than has been possible heretofore.

The enactment of a bill on reforestation whereby the state forester is given a definite appropriation of $10,000 a year for future work along this line alone marks the beginning of a practical demonstration of forest planting throughout the state. Over half a million of trees were set by private individuals last year, and the prospects are very bright for at least a million and a half being set this spring. It is believed our reforestation law is well adapted to this state. The state forester already has about 1,300 acres on hand for planting.

A forest fire protection act was passed last year by our general court, that is bound to accomplish great good. One of the greatest drawbacks to a stalwart, progressive movement in forestry is the destruction and wanton waste caused by fire. This act centralizes authority in the state and town with the idea of determined results.

A code of regulations as to fires set by railroads has been passed upon to the satisfaction of all parties concerned, and it is believed that when the Massachusetts policy has been perfected our present great losses from this cause of forest fires will be minimized.

Massachusetts has recently passed a law exempting from taxation all plantations of young forest trees for a period of ten years after the trees have grown two feet on the average in height and stand six by six feet.

The state forester, forest wardens, and fish and game deputies are all clothed with the power to arrest without a warrant all persons found in the

act of setting a fire in violation of the law.

Besides the special regulations and enactments above referred to, the office of state forester acts as a clearing house for our Massachusetts people in assisting in every way possible toward accomplishing results in forestry. Free, expert advice is given anywhere throughout the state, forestry literature is sent out in large quantities. The state forester has been in constant demand for public lectures, and everything looks extremely encouraging and hopeful for good results in the near future.

We, here in Massachusetts, are beginning to realize that the old Bay State of the future, from a forestry standpoint, will be just what we propose to make it; and it is believed we are awakening to our responsibilities.

Lumbering Approaching Forestry. Many Small Trees Left. Saplings Cut to Strew Road Worst Fault

A Typical Forest Scene in Eastern Washington

THE NATURAL TAXATION OF TIMBERED MINING LAND

By ROBERT B. BRINSMADE, E.M.

A COMMON objection to the natural* tax on land values is the alleged impracticability of estimating such values for purposes of taxation. It is the object of this article to show that this evaluation is not only practicable, but can be achieved without the introduction of any untried methods.

The land values with which assessors have to deal, may be divided into five kinds, viz: franchise, farming, townsite, timber and mining. In the case of franchise values, which include the rights of way and easements of railroads and other public-utility companies, the franchise may be evaluated by capitalizing the average annual surplus income after the cost of operation and repairs and the interest on all construction costs has been subtracted from the gross earnings. The more risky the investment, the higher should be placed the rate of interest on which the capitalization of the annual surplus is based. This class of values is now regularly estimated in New York State to comply with the Ford franchise-tax law.

The evaluation of farming land is well understood, having been studied for centuries, by assessors and boards of equalization, both in this country and Europe. Though townsite appraisement is not so thoroughly systematized, such legislation as the New York law requiring the separate assessment of land values and improvements has done much to perfect methods of evaluation. The system devised by W. A. Somers, of St. Paul, which starts with certain determined sites in each precinct and evaluates the surrounding lots by definite rules, has met many severe tests, and if not yet perfect bids fair soon to become so.

When we enter upon the appraisement of timber and mining land, however, we find ourselves tossing on a sea of contrary currents. While we can base farm values on the supposition of a perennial average crop and townsite values on a continual annual rent; we have to consider for timberland, a crop that will take from twenty to 100 years to mature and for mining land, a crop of minerals that can only be reaped once. Besides the evaluation we must provide, in the case of timberland, for its harvesting without undue waste, fire risk or ill effects on soil or water courses, and in the case of mining land, that its exploitation shall not only be economical, but harmless to life and to surface structures.

Until the inauguration of the forest-reserve policy, the quicker that the timberlands of the National and State governments were reduced to absolute private ownership, the better were our politicians pleased. In fact, many great fortunes were obtained by the theft of Government timber with the connivance of prominent officials. At this point, a distinction must be made between woodlands, that must be cleared to prepare for farming in the great valleys of the rain belt, and those forests on steep slopes or scanty soils, whose destruction makes only a desert. It is the last class that should be preserved and which requires special legislative treatment.

The assessment of timberland at its full value as standing timber, places a premium on its speedy denudation and tends to prevent the reforesting of the

*See "Natural Taxation," by T. G. Shearman.

land, when the wild growth has once been cleared. On the contrary, the entire release of timberland from taxation is class legislation and a denial of communal rights in land values.

Any efficient system for woodlands must include not only their correct taxation, but a strict control of their harvesting. A permit to cut timber over any considerable acreage should only be given after the logger's plans have been approved by the State forester, even when the land is privately owned. In this way, scientific methods of cutting could be assured and the dangers of soil destruction and forest fires eliminated.

A royalty system, based on a stumpage charge on the felled trees, has worked well in the public forests of British Columbia and is the method now commonly employed here, by private landowners, in selling their timber to loggers. The same scheme could be applied to the taxation of private woodland by making it tax-free until cut, when it would pay to the State the same proportion of its gross stumpage value as was assessed on the annual economic rent of farming or townsite land. In order to prevent the holding of large tracts of ripe timber for speculative purposes, as is now done in the case of Southern pinelands, another proviso would be necessary. This could be effected by charging an annual stumpage tax against all ripe timber whether cut or not. This tax on a given tract would be the minimum stumpage annually due to the Government, in case of a systematic cutting of the timber in sections, on some approved plan of permanent forest preservation. This advance stumpage tax could be deducted from the amount to be collected, when the timber was actually reaped. It would thus not mean double taxation or the undue forcing of legitimate cutting arrangements; but it would make it too expensive for any one to hold great areas of ripe timber unexploited, for speculative purposes.

The relative value of different woodlands is easily estimated, as the trees are in plain view and it is only necessary to note the number and size of the trees of each species and to figure the factors of expense in transfering the timber from the forest to the market. For mining land, the valuation is more complex as the minerals are originally hidden underground and the net value of many types of deposit can not be estimated till the ore has been brought to the surface and worked over into its marketable form. A royalty on output is thus the most practical system of assessment, and not only is it the method of taxation now used by the Mexican government for its great mineral industry, but it is the time-honored scheme used by private landowners, both here and in Great Britain, as a means of collecting revenue from mining land.

During the Spanish rule in America, one-fifth of the output of metals (gold and silver mostly) went to the crown as a tax; and, though the percentage taken has varied, the bullion tax is still a favorite method of collecting mining revenue in free Spanish America. Such a tax on gross output, however, though easy to assess and collect could only conform with natural-tax principles when the cost of bullion production was the same for all mines, and this is never the case.,

Where a mine is both owned and operated by the same company, the simplest way, to levy a land-value tax, is to take a percentage of the net profit remaining, after interest on betterments (as well as operating and maintenance expenses) has been deducted from the gross earnings. This would be an income tax, assessed on the unearned income only, and thus would differ from the Montana system, which levies on the whole net income without deducting interest. When the operator only leases the mining ground from the landowner, it is customary to pay a certain royalty per ton on all ore extracted; the tax should in this case be assessed against this royalty (provided it represents the whole economic rent), which is analagous to the stumpage payment on timberland.

To prevent that speculation which has now locked up much of our iron and coal lands in a few hands, it would be necessary to supplement the tax on royalty by provision for a minimum annual royalty charge on each deposit, to be payable whether the mineral had been extracted or not. For known ore reserves, the royalty should be calculated on the basis by which most leases of the Lake Superior iron mines are now secured from private landowners. It has not proved difficult to fix the minimum annual royalty equitably after the quantity of ore available has been ascertained by boring.

In the case of unexplored mineral ground, the condition of retention by the holder should be the same as is now required for mining claims on national land; i. e., a certain minimum quantity of development work should be performed on each claim annually. But sufficient inspectors should be provided in each mining district to ascertain if such work were actually accomplished. The present custom of the Land Office, to trust to a sworn statement of the claimholder, often enables "bad" men to make fraudulent affidavits each year and thus tie up, for speculation, numerous claims: This now occurs in any district where log-rolling or intimidation can prevent the other inhabitants from denouncing such perjuries.

It need hardly be mentioned that the national apex law, which enables the owner of the vein's outcrop to follow a non-vertical vein indefinitely in depth, should be repealed and a law limiting ownership to the surface side lines (as in Mexico, etc.) substituted. Though the lawsuits ensuing from quarrels of mine-owners, due to the ambiguous apex law, has helped to scatter widely the profits of land monopoly, through the conduits of the legal and mining-expert professions; it will no longer be of advantage to the community with the adoption of natural taxation and the ensuing equitable distribution of wealth.

An auxiliary change should be the separation of mineral from surface rights in agricultural land; and this reform should apply not only to all the remaining Government land, but also to all tracts in private possession on which mineral has not yet been discovered. This separation is a feature of the Code Napoleon and applies not only in Mexico and other Latin countries under that code, but has had a partial application in such British colonies as Canada, Australasia and South Africa. If such a separation had been in force here, it would have obviated such absurdities as the enrichment of the Oklahoma Indians from royalties on oil lands, which they never lifted a finger to develop. The reform would not only stimulate prospecting east of the Missouri River, but would prevent the failure of many operators, in such districts as the Missouri and Wisconsin zinc-lead fields; as the operator would be allowed to retain the royalty, now going to the landowners, unless such royalty represented a true economic rent.

The proposed mining fiscal system would entirely free from taxation not only all mines in the development stage, but also all those producers which actually show no *net* profit above expenses and interest on betterments. It would indirectly subsidize the prospector to perform the necessary service of opening new ore deposits, and at the same time render available the great revenue from the profitable mines, most of which is now untouched by taxation.

State mine inspection is now confined to the enforcement of rules for the protection of life; but, except in the coal districts, such inspection is apt to be perfunctory. Inspection should not only be made rigid for all mines, but should be extended to supervise the general working plans as suggested for timber tracts. Operators must be prevented by law, from wasting the Nation's mineral resources, and the only method by which it can be done is the enforcement of scientific economy by state supervision.

The proposed taxation changes would stimulate rather than hinder legitimate lumbering and mining. They would

not only prevent unnecessary deforestation and the hogging of ore bodies; but through their hindrance to land speculation would tend to raise competitive wages and to give the small operator a more equal chance with the trust. As shown in my article in the Chicago *Public* for April 24, 1908, the general effect of the natural tax would be to increase the incomes of the poor from the present privileges of the rich; while leaving the middle class unaffected in their incomes from privilege, but benefited in their earnings as salaried workers. These effects would be soon produced by the outlined reforms in the lumber and mining industries.

In the United States, we have the curious spectacle of the most scientific people in wealth production, lagging far behind much younger nations in applying science to wealth distribution. This is due not only to the entrenchment of vested wrong behind complicated legal barriers, but also to the hetereogenity of the population and to the fact that its dominant native element is still too blinded by the extreme individualism of a recent pioneer life to be fully alive to communal interests and rights.

Shore Line of Moss Lake

In the Pineries near Du Bois, Pa.

WATER CIRCULATION AND ITS CONTROL

By BAILEY WILLIS, E.M.C.E., United States Geological Survey

(Concluded)

CONTROL OF RUN-OFF THROUGH GRAZING

ABOUT twenty-five per cent. of the area of the United States is so situated with reference to topographic and climatic conditions that it will best raise hardy grasses and must be devoted chiefly to grazing. The principal area is that of the great plains, extending from northwestern Montana around the base of the Rock Mountains to Texas, but including also portions of the basin region on the west. Within this area the governing condition is a meager precipitation. The soils are appropriate to agriculture, the mountain ranges above the plains are suited to forestry, but both agriculture and forestry require more water than the grass that feeds herds, and they are accordingly limited in distribution in this region. The herdsman's prosperity depends absolutely upon the grass. It is proved beyond dispute that overgrazing injures the grass, partially removes the protective cover, and promotes erosion. Erosion eventually results in the removal of all herbage, produces bare, gullied badlands, and makes restocking with grass impossible.

The method available to the herdsman for the limitation of run-off and the prevention of erosion is to increase the stand of the natural grass cover, upon which alone his herds depend. In some small areas he may find it necessary to adopt the usual methods of agriculture to check erosion, establish soil, and re-cover the surface with grasses, but in general that which any intelligent herdsman does to maintain the range upon which his herds live is that which he must do to prevent erosion and to limit run-off. Thus intelligent grazing promotes both individual and general welfare.

The preservation of grass upon the semiarid plains is of vital interest, probably, to the farming states, Minnesota, Iowa, and Missouri, and even more so to eastern Nebraska and Kansas. If it be true, as stated in the opening discussion of conditions of precipitation (p. 265), that radiation from the hot plains checks rainfall, it would follow, should they be eaten bare and eroded to badlands, that the semiarid climate would extend eastward. The plains themselves would become more arid, the farming districts adjoining them would be affected by prolonged droughts, and the climate would be unfavorably modified as far east as the western margin of the moist-air currents that flow north from the Gulf. Iowa is interested in the grass that grows in western Nebraska.

FOREST CONTROL OF PERCOLATION AND RUN-OFF

The areas which must be kept forested in North America comprise twenty-six per cent. of the whole continent. Of the United States nineteen per cent. requires forest protection or will grow trees more profitably than any other crop. The necessity for this amount of forests rests on two imperative economic conditions, (1) the value of forest products, and (2) the protection forests afford to other essential needs and activities of civilized communities.

It is not proposed here to discuss for-

est products, except to point out that their value maintains forests in areas where agriculture might be pursued if the forest products were not more valuable than the possible agricultural products. The distribution of forests, considered with reference to their products, is wholly one of cash returns. On this basis alone, however, the percentage area now left us cannot economically be reduced until the increasing population begins to feel a scarcity of grain. The present price of lumber, the search for substitutes, and the coming timber famine sufficiently prove this.

Forests protect all civilized activities that depend on a regular supply of clear water or that are liable to injury from irregular and excessive flood run-off. They are not the only protecting agency. We have discussed the very great importance of engineering and good tillage in this respect. But wherever they grow forests do protect, and they do grow and protect where no other agent economically can.

This truth is challenged, for we inherit the habit of the ax and the saw, and the effects of our reckless use of these tools are not yet so conspicuous as to be clearly distinguishable in the gross result of natural and artificial activities. The challenge cannot stand, however, against any fair consideration of the relations of forests and water in contrast to those of bare slopes and water.

In the opening pages of this paper we considered those phases of water circulation that are known as precipitation, ground water, evaporation, and surface flow. Forests affect each one of these, and each will be discussed in turn in the order named, so that we may clearly distinguish the several aspects of controverted points.

Forests in relation to precipitation.— Precipitation consists of rainfall, and in cold climates of snowfall, also, and these two kinds of precipitation are differently affected by forests. Concerning forests and rainfall, unqualified statements have led to exaggeration and contradiction by which the real facts are obscured. When a vast plain like the upper Mississippi Valley from St. Louis to the Great Lakes is cleared and brought under cultivation, no notable change in the amount of precipitation is likely to follow, for the air currents which sweep over it come from the Pacific and from the warm humid atmosphere of the Gulf. They are loaded with moisture and are driven north toward cooler zones. Rain falls from them inevitably, in spite of any minor effect of radiation from the fields of Illinois or Ohio. Were the wide surface stripped of green and soil and left a region of rock and sand, as central Asia was,[1] then local radiation would doubtless increase the irregularity and violence of rains, but the air rising from our fields of grain, though not as cool as that above a forest, is not so heated as to materially affect the powerful rain-bearing currents. Moreover, the general evenness of altitudes and uniformity of radiation from the green covering over a wide area tends toward regularity of conditions and gradual rather than violent changes. The ocean of green, whether of trees or grain, ameliorates the climate in like manner, though not in like degree, as does an ocean of water. Hence it is reasonable to expect that the total precipitation and the run-off, as indicated by stream gauges on rivers fed from this region, will not show any decided change as a result of deforestation. This appears to be the fact, though careful observations of rainfall and run-off have been too recently begun and are made at stations too far apart to give satisfactory data for comparisons.

Deforestation of a mountain range presents a different case, since in the long run it results in extensive erosion and bare surfaces. Leaving this last

[1]Pumpelly, Raphael: Relations of Secular Rock Disintegration. *Am. Jour. Sci.*, vol. 18, Feb., 1879.

statement to be discussed under "Erosion," we may compare rainfall on wooded mountains with that on barren ranges on the basis of extended human experience. The mountains of southern Spain, the Pyrenees, the Basse-Alps of southeastern France, the northern Apennines, the Dalmatian and Grecian hills, have all been stripped and eroded. The change from green-covered slopes to brown, bare steeps has been accompanies by a change from beneficent rains to destructive downpours. Statistics of precipitation in earlier times are not available for comparison with those of the present, but historical evidence is entirely adequate to prove that deforestation of a mountain range has modified the conditions of precipitation in such a manner that occasional heavy, destructive rains replace gentle and more frequent showers, at least in the countries mentioned.

These countries differ from northern Europe in a measure as the semiarid region west of the 100th meridian in North America differs from the Mississippi Valley. To this fact is due in large part the difference of opinion which exists among European writers as to the influence of forests on precipitation, springs, and run-off. Those who have observed in northern Europe the effects of deforestation of flat lands under humid climates minimize or deny entirely any influence exerted by forests; while those whose experience is with warmer, more arid, and consequently more critical conditions in mountainous southern Europe are convinced that forests exert an important beneficial influence upon rainfall, ground storage, and surface waters. To cite the latest conclusions we may quote from Cipolletti.[2]

> It is generally admitted that regions covered with forests have a lower temperature than the open country, and the reason assigned for this is the evaporation from the surface of the leaves moistened by the rain, the area of which surface is estimated by Mr. Schleiden at fifty times that of the ground. Another cause is the constant evaporation during the vegetation season by exhalation of the same leaves, which Mr. Lafosse estimates at 150 cubic meters per hectare and day; and, finally, the large quantity of heat lost through the fixation of carbon, which the same Mr. Lafosse, upon the data furnished by Messrs. Lecart and Parisel, estimates, per hectare and day, at so many calories as will melt a block of ice 316 cubic meters. On the other hand, these same quantities of water which the forests continually emit into the atmosphere must help to increase the degree of humidity of the parts which immediately surround them. Thus, while on the one hand the temperature is lowered, the humidity is, on the other hand, increased; and hence it appears to be quite a logical and natural conclusion that within the forests the point of saturation of the air must be reached more quickly and more frequently than in the open, and consequently rain will also fall more frequently and in greater quantities.
>
> This theoretical conclusion is borne out by abundant facts and experimental data.
>
> Mr. Riedel quotes the island of St. Helena and Lower Egypt. On the former, owing to reforestations effected on a large scale, the rainfall has actually been doubled since the times of Napoleon I; and in Lower Egypt, where in the eighteenth century rain only fell on from ten to twelve days in the year, the number of rainy days nowadays reaches from thirty to forty, since some 20,000,000 of trees have been planted. On the other hand, on the shores of the Mediterranean, in Syria and Palestine, there are numerous regions which were formely in a flourising condition, but have become today arid and waste in consequence of the destruction of forests.
>
> Mr. Ponti refers to the observations made at the Nancy school of forestry, which were confirmed in Russia by Professor Volsky, and by which it has been found that the rainfall in the interior of the forests was greater than outside of them. He adduces also the facts that in England, although it has not been possible to prove that the deforestation has caused here any reduction in the amount of rainfall or any appreciable change in the climate generally, it has been found nevertheless that the temperature is lower in forest-covered regions, the difference being as much as three degrees on the hottest days.

In regions where a considerable part of the precipitation is in the form of snow the forest catches it in the branches, protects that which falls to the ground from the sun, and retards its melting. These effects bear upon the proportions that evaporate or run

[2] Permanent Intern. Assn. of Navigation Congresses. X Congress, Milan, 1905. Report by Cipolletti, C., on Deforestation, etc.

off or sink into the ground and will come under those heads. It does not appear that forests influence the amount or distribution of snowfall.

Forests in relation to ground water.—Inasmuch as ground water and soil moisture are wholly derived from precipitation, any effect that forests may have in regulating rain extends to them. As compared with bare ground which receives all the rain and snow that fall, the ground beneath trees gets only a part, as they catch some proportion in their foliage. The percentage caught varies from twenty to forty per cent. of the precipitation measured in adjoining fields, according to the kind of trees, the density of stand, and other factors. Thus, if the conditions for percolation are the same under the trees and in the open the earth under the forest receives less than that under the bare surface. An approximation to this assumption is reached on level plains, provided the soil in the open be in an excellent state of tilth.

That proportion of the rain and snow which reaches the ground under the trees wets the mulch of mosses, leaves and decaying wood, and such part as is not thus absorbed seeps into the ground below. Only a small part escapes as run-off, unless the slopes be very steep. The mulch of decaying vegetable matter is extremely absorbent and will hold as much as fifty per cent. of its own volume, or two to three times its weight of water. From extended experiments in Germany with straw, leaves, and humus it appears that the moisture thus caught is evaporated to the air in dry seasons, and it would therefore be uneconomical from the point of view of ground-water storage to increase the surface litter beyond that required to prevent run-off. Under some conditions of forest maintenance it would probably be economical to keep the surface comparatively clean of litter and in an open state, such that the rain sifting gently through the foliage would be absorbed by the ground in a maximum degree.

The subsoil beneath the forest near the surface is moister than that beneath the adjoining fields. This is due chiefly to the covering of moist surface litter and to the relatively small evaporation at the ground surface. Deeper in the subsoil, at depths below a foot, the forest soil is often drier than that below the adjoining fields, for the tree roots take a large amount of water which is given off through the foliage. Thus, if we contrast the soil condition under the forest with that under the bare field we shall find the ground beneath the forest moister near the surface and drier below. The continuity of water films in the ground is a condition which promotes percolation, and the relatively moist surface layer thus aids the falling drops in reaching the deeper, drier layers when precipitation occurs. In the open, when the surface layer becomes measurably dried out and filled with air, a sudden rain may so occupy the pores of the immediate surface as to seal them against the escape of the underlying air, and the latter then prevents the percolation of water, and the impervious surface becomes one on which run-off is inevitable.

The total effect of trees in preventing some proportion of the rain from reaching the ground and in using some part of the moisture contained in the ground in their physiological processes is indicated by the depths to which they depress the level of ground water as compared with that in adjacent fields. Observations on this point have been made in Russia, France, and Germany, and the results are in agreement for European conditions. They were made on level ground, and the conclusions do not apply where run-off from the surface is copious. It is shown that—[3]

(*a*) The water table lies deeper below the surface under a forest than outside of it, if account be taken of the relief;

(*b*) The depression of the water table is more pronounced under old forests than under young plantations;

(*c*) The depression is more pro-

[3]Henry, E.: Les Forets de Plaine, Les Eaux et Forets, vol. 42, 1903, p. 161.

nounced in dry climates than where there is much rain.

The amount by which the water table may be depressed varies from a fraction of a meter to as much as three meters. It is observed in the level steppes of southern Russia, where the rainfall is moderate, that springs are found outside of the forests rather than in them. In citing these results, it is important to insist upon the distinction to be made between level and sloping surfaces. A comparison of the ground-water level beneath the forest with that beneath a flat field in which percolation is at a maximum gives an entirely different result from a similar comparison, in case the surface is so inclined as to permit run-off from the bare ground.

According to very careful and accurate observations made in Switzerland from 1903 to the present time and still in progress, it is found that the run-off from a wooded watershed is but sixty per cent. of that from a cleared watershed, all other conditions being the same; and that the maximum high-water level of the stream from the former is thirty to fifty per cent. lower than that of the stream from the latter.

The same observations establish the reciprocal fact that there is a larger and more continuous percolation of water into the ground and steadier flow of springs during drought from the wooded watershed than from the cleared watershed.[4]

Forests in relation to evaporation.—At the surface of the soil moisture passes into a state of vapor and is carried away by the air; this is evaporation. At the surface of a leaf moisture is given off by the living organism; this is transpiration. Evaporation is a physical phenomenon which increases with the dryness, temperature, and movement of the air; transpiration is a physiological phenomenon which depends upon the kind of plant and its response to the conditions to which it is exposed. Evaporation from the soil draws upon the moisture contained in the capillary spaces between the soil grains and extends down to the point where the soil is saturated—that is, to the water table in humid regions, or in arid regions to the point where the subsoil is so dry that the capillary films are no longer in contact. It continues until the available moisture in the soil is so reduced that the tension of the films about the soil grains becomes great enough to resist the tendency toward vaporization at the surface, and evaporation then practically ceases, although diffusion into the air spaces of the soil continues even at some depth. Transpiration from the surface of the leaf responds in some measure to sunlight and shadow, to humidity and dryness, and to temperature. Among these humidity is the most important. The rate of transpiration is, however, subject to physiological regulation, the mechanism of which is not understood. In certain experiments conducted by the desert laboratory it was found that in plants under examination the water loss due to transpiration was checked at temperatures above seventy-nine degrees Fahrenheit, whereas the checking action disappeared at lower temperatures.[5] Thus, some plants possess a means of defense against excessive transpiration during hot weather and drought, whereas the inert soil must go on yielding moisture almost to the last atom.

There is a certain amount of evaporation from the leaf surface, but it is exceedingly slight. It differs from transpiration in that it takes place through the tissue itself, whereas transpiration occurs through the stomata. A grape which has no stomata gives a good illustration of the very small amount of evaporation from such surfaces.

Underneath the trees in the forest

[4]Engler: Der Einfluss des Waldes auf den Stand der Gewässer. Centralblatt für das gesammte Forstwesen, Jan., 1907, pp. 35-40.

[5]MacDougal, D. T.: Botanical features of North American Deserts. Carnegie Institution, Publication 99, 1908, p. 86.

the conditions are much less favorable to evaporation from the soil than in a bare field near by, the humidity being higher and the temperature very much lower. Above the trees also the air is cooler and more humid than it is at the same altitude above bare ground. This last statement requires some explanation. Sunlight passing through the air raises its temperature somewhat, but a more important influence is that of the currents of air set up by contact with the surface upon which the sunlight falls. We all know the heat which rises from bare ground, and how comparatively cool is the sward. Similarly the surface of the ground is hotter than the surface of the foliage of a forest. The effect of radiation from these two contrasting surfaces is shown by the experience of French aeronauts to extend to a considerable height. According to E. Henry:[6]

> The cooling effect observed by æronauts in passing over forests of a certain extent is indicated by a marked descent of the balloon. It is a well-established fact that this effect was experienced by a number of military balloonists above the forest of Orleans, the balloon being at an altitude of about a thousand meters. It appears to be demonstrated by the balloon ascensions made up to the date of the statement that the influence of forests of similar extent (34,000 hectares, or about twenty square miles) is observable up to an altitude of 1,500 meters.

To sum up the preceding considerations. The effect of these complex relations has been made the object of investigation, particularly in Germany, through the study of the amount of moisture remaining in the soil under the various kinds of trees, and in the adjacent open. Some reference to these results has already been made; but the general conclusion is that the effects of transpiration from luxuriant foliage are very materially greater than those of evaporation from the bare level surface.

The most striking illustration of this factor is the effect of eucalyptus trees, which, planted in the Pontine marshes near Rome in 1870 (in the vicinity of the Convent of St. Paul of the Three Fountains), have lowered the level of the ground water several decimeters. In this case the transpiration from the water-loving eucalyptus is more vigorous than was the evaporation from the water and vegetation of the swamps.

The relation of the forest to run-off on level land is not an important factor. As we have already seen, it is possible to keep level fields in such a condition of tilth that the amount of run-off from them is no greater than that from the forest. On slopes the case is different. The effect of the forest is, first, to diminish the violence with which the rain strikes the ground and compacts it, for the drops are checked by the foliage. They fall from branch to branch and reach the ground with greatly diminished momentum and in a finer state. That portion which drops from the leaves comes in larger masses, but still gently. Beneath the forest the rain finds a moist soil whose capillary water is capable of vigorous downward circulation. The soil is also opened by the forest roots, and being protected from the compacting and cementing influences of a free exposure is decidedly porous. All these conditions militate against run-off and promote absorption. In consequence the run-off from forest areas gathers slowly as compared with bare slopes, and the ratio becomes increasingly favorable in regard to forests as slopes become steeper. This fact enters into the consideration of the value of forests in mountain regions as compared with those on plains. Ebermayer,[7] from whose paper many of the data used in this report have been taken, says:

> In view of the exact investigations which have been cited above, and which extend through thirty years, it is no longer possible to maintain the assumption so generally made, that forests increase the amount of ground water and constitute a storage reservoir for the supply of springs, at least not

[6] Henry, E.: Sur le rôle de la forêt dans la circulation de l'eau à la surface des continents. Comptes rendus du Congrèss des sociétés savantes en 1901.

[7] Ebermayer, Ernst: Einfluss der Walder auf die Bodenfeuchtigkeit, auf das Sickerwasser, auf das Grundwasser, und auf die Ergiebigkeit der Quellen. 1900. p. 38.

so far as plains are concerned. The draining effect of the forest is, on the contrary, so great that a much greater supply of water gathers in the depths beneath a treeless plain than beneath dense woods, provided that the underground conditions be the same in both cases. It follows that under these conditions the discharge of springs is not increased, but lessened, by woods. Decided emphasis must, however, be laid upon the fact that these conclusions hold primarily only for the plains, and are not to be extended inconsiderately to uplands and mountains. Although the influence of the woods upon soil, moisture, percolation, and ground water under like conditions must be the same in mountains as it is in lowlands, and only moderate differences are likely to appear, nevertheless the forest on the mountain differs very decidedly from that on the plain in regard to water control, inasmuch as in mountain regions, in consequence of the surface run-off of rain and snow water from the slopes, a factor is introduced through which wooded mountain slopes receive a much larger amount of water than bare, unwooded watersheds.

Forests in relation to erosion.—The emphasis which Ebermayer lays upon the loss through run-off from bare slopes is in no sense exaggerated. The detrimental character of this loss in relation to storage of water for all the activities of civilized communities, including navigation, cannot be exaggerated. Its effects have already been described in speaking of flood run-off, but we may here recur to the injury which it does, particularly with reference of the erosion of soil. If it were conceivable that we could adjust our activities to the loss of one-half of the available water through flood run-off it would still be inconceivable that we could permit the accompanying loss of the soil. Without soil the earth becomes a desert and without soil man must cease to exist.

This consideration is of prime importance everywhere, but it assumes overshadowing importance beyond any other in mountain regions of large rainfall. The Appalachian Mountains constitute such an area of great extent and of very marked character, and they occupy a very critical position in the center of the richest half of our country. Concerning the effect of uncontrolled run-off from this region we have, unfortunately, abundant evidence, the emphatic testimony of ruined and abandoned lands.

Summing up the observations of the thoroughly qualified and unbiased observer, L. C. Glenn, we are able to show what relation the destruction of the forest bears to run-off in the watersheds of the southern Appalachians.

Forty-six creeks and small rivers, whose watersheds may be described as timbered rather than cleared, are known, according to observation and local repute, in times of flood to rise gradually, to continue high for several days, and to subside slowly. They carry but little sediment and they maintain a good volume of water during dry seasons.

Thirty-eight creeks and small rivers in the same watersheds, whose slopes may be described as cleared rather than timbered, are known, according to observation and local repute, in times of flood to rise rapidly to extreme flood height, to carry excessive quantities of mud, sand, and gravel, and to fall quickly. In dry seasons they are very low, and the range from lowest to highest stages has increased and inflicted much damage in very recent years.

Two other classes of conditions may be recognized in Professor Glenn's descriptions: The one of valleys still timbered, but which are being damaged by beginning of logging and particularly by erosion of logging chutes; the other, of watersheds that are largely cleared but grassed, and which the grass protects from erosion, though not in the same degree from rapid run-off.

Such evidence as this, collected by a qualified and impartial observer with reference to individual watersheds, establishes for the region in question, comprising the mountains of North Carolina, Tennessee, and Georgia, the fact "that forests do exert a beneficial influence on stream flow by storing the waters from rain, preventing their rapid rush to the streams, and paying them out gradually afterward, thus acting as true reservoirs in equalizing the run-off."

These detailed observations sustain the general facts which every mountaineer

knows: That streams which flow from a forested area rise slowly, carry little sediment, and fall slowly in times of flood, and throughout the year are relatively far more uniform in their flow; whereas streams which flow from deforested regions rise quickly, carry heavy bodies of sediment, and sink early in the season of drought to minimum low-water stages.

On the basis of superficial observation it is sometimes said that deforestation as it is now proceeding in the Appalachian Mountains does not seriously affect the streams, because the forest which the lumberman cuts is soon replaced by an aftergrowth. It is true that the full effect of deforestation follows immediately upon lumbering only in extreme cases, but wherever the forest and the superficial forest soil are removed a beginning has been made in the process of erosion which will ultimately remove all the soil. The aftergrowth that follows the severe cutting and burning under modern lumber conditions is a weakened growth. It never covers the surface as the virgin forest did; it is always traversed by freshly cut gullies, and the level of channel grades is sunk below the surface from a few inches to ten feet or more. The advantage thus given to the eroding power of thousands of rills is not overcome by any natural process. Man alone can so direct and localize a defense as to make it effective, and he does it only at great cost. It is true that under favorable conditions the soil will maintain itself till the trees of the aftergrowth become merchantable timber, and that the processes of cutting, burning and partial erosion might under the most favorable circumstances be continued till several crops had been cut from the surface and a half a century or more had passed, but the result would be deferred merely. That result is to be seen in the bare mountains that stretch from Spain to Asia Minor and in those of northern China.

The forests have long protected the Appalachian Mountains; they were growing throughout the eastern United States when a great plain stretched unbroken from the Atlantic to the Mississippi, and they have continued their growth, though changing in species and in distribution, while the earth's surface has been raised to the heights from which the mountains are being carved. During the whole process the forests have conserved and protected the mountain slopes from washing.

Let us pause to consider the slow changes of the ages that preceded the advent of man, the destroyer, or possibly the protector.

On a vast plain covering the area of the eastern United States and Canada there grew a luxuriant forest. The plain was almost continuous.

Within the earth titanic forces gathered gradually till their power sufficed to raise the surface slowly and to elevate the plain. Rising in a zone that reaches from Canada to Alabama the elevated plain became a plateau from which many rivers flowed to the Atlantic and Pacific. As the slopes steepened, the waters, falling swiftly, cut their channels deeply and made canyons, which widened to valleys. Genial climates favored vegetation, which during the long, slow process of mountain growth and valley carving never was removed extensively. Woods prevailed and held the soil, always adjusting their growth to the very gradual changes of the valley slopes. If perchance a steep was bared by a sudden landslide it was in time washed clean to the hard rock and became a cliff, or caved and extended till vegetation could take a foothold again. Thus the mountains of to-day were slowly carved from the upraised mass, and ever through the ages the forest trees grew and flourished and died, generation after generation, in the soil their roots held fast and enriched and deepened. It was their destiny to outlive the mountains, whose inert mass must yield eventually to the unceasing attacks of erosion and be worn down again to a gently sloping plain, over which the forest should stretch its living covering. But man has come, he holds the forests' destiny in his hands, and his own is intimately linked with theirs.

Virgin Redwood near Crescent City

CHEMISTRY AND CONSERVATION

THE attitude of American chemists toward the conservation of natural resources is clearly shown by the proceedings of the American Chemical Society at its last (Baltimore) meeting. On this occasion the president of the society, Dr. M. T. Bogert, of Columbia University, delivered, to a large and enthusiastic audience, his presidential address on the subject of conservation. The address was immediately followed by the report of the committee appointed to cooperate with the National Conservation Commission. This report is signed by F. W. Clarke, chairman; H. W. Wiley, C. F. Hertig, S. W. Parr, and R. B. Dole, and reads as follows:

In May, 1908, a meeting of the governors of the different states was held at the White House in Washington to consider the conservation of our rapidly wasting natural resources. Following this meeting, a commission was appointed by the President of the United States to investigate the subject, and the principal scientific societies of the United States were invited to cooperate with it. The committee of the American Chemical Society, appointed in response to this invitation, now has the honor to submit the following preliminary report:

On December 8, 9, and 10 the National Conservation Commission met in Washington in joint conference with the delegates of other organizations and the governors of more than twenty states. The commission, in its elaborate investigations, had, so to speak, taken stock of our natural resources, and its report, therefore, was essentially statistical in character. It had estimated the magnitude of each particular resource, and had studied the rate of consumption of such substances as lumber, coal, iron, etc. It discussed the wastage of the land by preventable erosion, and its effects not only upon agriculture but also in reducing the navigability of streams. Questions like these were treated at considerable length, and their general character is all that need be mentioned just here. The data of the Commission were mainly classified under four headings, namely, minerals, forests, lands and waters, and under each one the evils to be remedied were pointed out with all the emphasis and clearness which the statistical method of investigation made possible. The Commission cleared the ground for study into the prevention or limitation of future waste; and the problem of conservation can now be taken up in a more intelligent manner than has been possible hitherto. We now know better than ever before what the evils and dangers really are; the next step is to discover remedies, and then, finally, to apply them. The public attention has been aroused; the people of the country are awakening to the necessity of greater prudence and economy in the use of our resources, and definite lines of action can now be laid down with a reasonable probability that they will be followed. Fortunately, the reports of the Commission are neither sensational nor unduly pessimistic; the results of their conferences are presented seriously, and in such a manner as to compel consideration; they are, therefore, all the more likely to produce permanent effects of great benefit to the American people. The utterances of the mere alarmist rarely carry conviction; but disclosures like these made by the Conservation Commission cannot be disregarded.

Up to the present moment chemistry has had little to do with the investigations of the Commission. Henceforward the chemist must be called upon in many ways, for the waste of re-

sources is often preventable by chemical agencies. Chemistry has already done enough to prove its potency, and its influence is felt in every branch of industry. Adopting the classification of the Commission, we shall find the chemist active under every heading. Under minerals, we must note that metallurgy is essentially a group of chemical processes by which the metals are separated from the ores; a separation which may be either wasteful or economical. Within recent years, within the memory of members of this society, the available wealth of the world in metals has been enormously increased. By the cyanide process for extracting gold, ores are now profitably worked which were formerly worthless, and at the same time the demand for mercury has been decreased. The Bessemer process for steel making, now also modified for use in copper smelting, is purely chemical; and its later modification, the Gilchrist-Thomas process, applies similar principles to phosphatic ores, which were previously of little value. Furthermore, in the last-named process, phosphatic slag is produced, which is useful as a fertilizer and helps to relieve the drain upon our rapidly wasting supplies of phosphate rock. Chemists are now studying, with much success, the problem of preventing corrosion in iron, a research which will prolong the life of iron structures and thereby reduce the waste of ore. The use of coal slack by briquetting methods, is largely based upon chemical investigations: the salvage of by-products from coke ovens, such as tar and ammonia, is wholly due to chemical research; coal is further economized by the study of boiler waters and the consequent prevention of boiler scale. Even inferior coals, lignites, are now converted into what is known as producer gas, and so are transformed into the best kind of fuel. Petroleum is refined by chemical means, and every fraction of it is saved, either as illuminating oil, as gasoline, as a lubricant, as vaseline, or as paraffin. These are all notable achievements, but greater are yet to come. Enormous quantities of valuable substances are thrown into the atmosphere in fumes from smelters, which should, and probably can be, partly saved. Electro-chemistry is rapidly developing a large group of new industries, making such metals as aluminum, magnesium, and calcium available for use, and it is reaching out into other fields of electro-metallurgy in which electric heat, generated by water power, will be used for smelting other metals, thereby reducing the consumption of coal.

In forestry also, the influence of the chemist is distinctly felt. The sprays used for destroying noxious insects are chemical preparations. The manufacture of wood alcohol is a chemical process, which may be either wasteful or economical. Turpentine is now produced wastefully, but the waste can be diminished by careful refining, and furthermore, the chemist can aid in discovering substitutes for it. Substitutes for tan bark are also to be sought for by means of chemical investigations. Another distinctively chemical operation is the preparation of wood pulp for paper making, a process which is now wasteful in the highest degree. It is estimated that for every ton of pulp now made by the sulphite process, more than a ton of waste material is allowed to drain away into our streams. How to make this material useful is a chemical problem, and so also, in great part, is the investigation of other, now useless, fibers which may replace the more valuable wood. The preservation of wood from decay is still another art in which chemistry is predominant.

In preserving the fertility of our land, chemistry has an important part to play. Our knowledge of fertilizers, of the food on which crops can thrive, is entirely chemical so far as accuracy is concerned, and must be applied in accordance with chemical principles. A fertilizer which is useless, and therefore wasted on one soil, may be needed on another. Certain fertilizers, like the Stassfurt salts, Peruvian guano, the Chilean nitrates, and phosphate

rock are limited in quantity, and their future exhaustion must be considered now. What shall replace them in the future? Already processes have been devised for fixing the nitrogen of the atmosphere and rendering it available for plant food. Saltpeter and other nitrates can be and long have been made from waste materials, such as old mortar and animal refuse. The phosphatic slags have been mentioned in connection with metallurgical processes. These sources of fertility are important, but greater still is the source found in our municipal sewage. The problem of its salvage has been worked out in some localities, but in the United States the people are only beginning to be aroused to its importance. Enormous masses of material, easily available for fertilizing purposes, now drain into our rivers or directly into the sea. Another question, now under investigation, is the possibility of using our common feldspathic rocks in fine powder, to replace the potassium withdrawn by plants from the soil.

The relations between the chemical composition of water and the conservation of natural resources are of intimate and fundamental importance, and some of them have been mentioned under other headings. The rate at which the land surface of the United States is being transported to tide water has recently been estimated by means of chemical analyses of river water coupled with determinations of stream flow, and the results of the computations will doubtless assist considerably in studying soil erosion and the impoverishment of agricultural lands. In steam making the chemical quality of the water supply is an appreciable factor in fuel consumption, a subject to which reference has already been made. The scale that forms on the boiler shell and tubes, when water containing incrustants is used, is a poor conductor of heat and, consequently, causes increased expense for fuel. By detailed study of the chemical composition of available boiler waters, it is possible to select a supply having a minimum amount of incrusting, corrosive, and foaming constituents, thereby effecting appreciable economy in fuel. Chemical investigation of methods for purifying water supplies, not only for boilers but for paper manufacture, soap-making, and other great water-consuming industries, will enable manufacturers to make new and greater saving in many raw materials other than fuel.

Stream pollution by industrial refuse and by sewage is a source of enormous waste in our natural resources. The subject has been for many years a field of research for industrial, sanitary, and biological chemists in the United States, and their investigations have resulted in the improvement of manufacturing processes, the utilization of wastes, the purification of sewage, and the protection of domestic water supplies. When the presence of deleterious substances in our river and lake waters has caused loss of fish life and the destruction of oyster beds, the chemist and the biologist have detected the harmful ingredients and have suggested methods for their removal. River silt, an important source of detriment to navigation, is also estimated by the chemist. It has been fully demonstrated that the prevention of stream pollution lies not alone through injunctions and other legal proscriptions, but also in using waste materials or, when that is not possible, in rendering them harmless. The chemist has much to do in protecting and preserving the quality of our water supply. Upon that, in very great measure, depends the preservation of our highest resource, human life. Polluted waters distribute typhoid fever and other dangerous diseases, and so cause losses which should be, and really are, preventable.

The foregoing illustrations are enough to show, for present purposes, the intimate connection between chemistry and the study of conservation. They also bring out the fact that the classification adopted by the National Commission, although admirable for statistical research, is not final, and that it needs to be supplemented by a different subdivision of the data. The

facts to be investigated often fall under more than one heading of the classification, and actually interlock in every conceivable manner. To operate a placer mine, for example, abundant water is needed, while a deep mine requires timber for its shafts and levels. In building and occupying a house one covers land, uses lumber, brick, stone, and iron, introduces water supply, and burns fuel. In short, every phase of the conservation question affects the interests of everybody. If the investigation of our natural resources is to be made effective, it must be applied to individual industries, and in order to do that another scheme of classification would seem to be necessary. Such a scheme we venture to outline, but very briefly.

At the outset the problem can be divided into two parts, one relating to sources of energy, the other to material substances. The two are not really separable, but may advantageously be considered separately.

In the first place, the energy available for industrial uses may be classified under three heads, as follows: First, inexhaustible energy, such as solar radiation, wind power, tidal power, and, with certain limitations, the power furnished by flowing streams. Second, reproducible or renewable energy, like the power supplied by horses and other domestic animals. Wood, regarded as fuel, also falls under this heading, for forests can be artificially grown. Third, the exhaustible energy represented by mineral fuel, like natural gas, petroleum, and coal, which, once used, is gone forever. Under this classification the practical problems are, to economize the exhaustible energy, to encourage the development of renewable energy, and to discover new methods of using the inexhaustible energy.

Exactly the same classification applies to material substances. Some, like sea salt, limestone, and clay are, humanly speaking, inexhaustible. Agricultural and forest products are reproducible, some of them year by year. The metallic ores and such useful minerals as phosphate rock are, however, exhaustible, and need to be conserved.

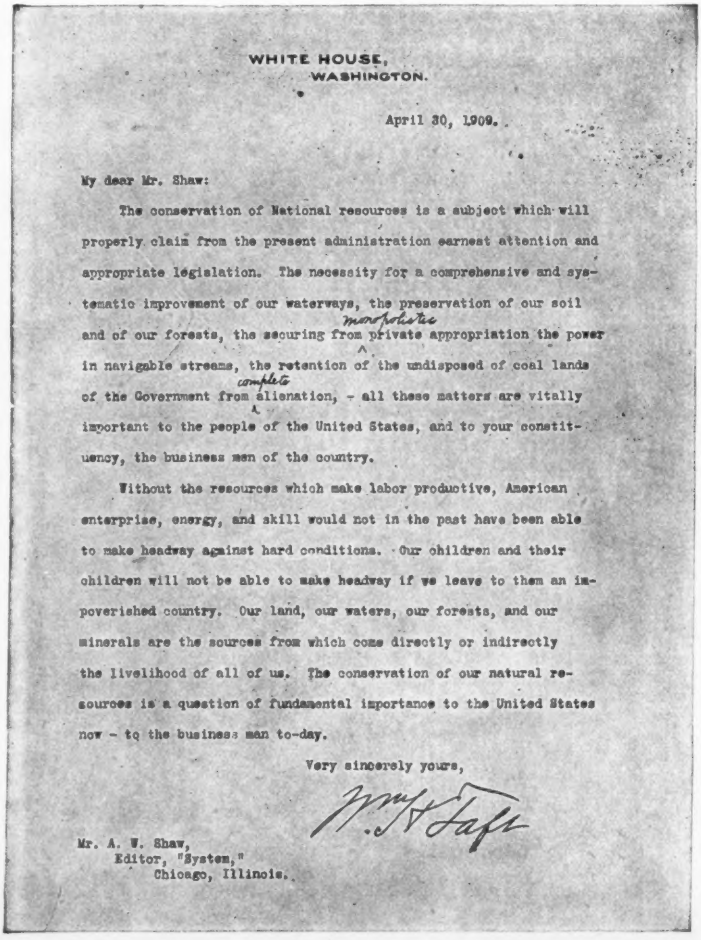
With the aid of this very simple classification it becomes possible to analyze a specific industrial problem in such a manner as to make evident its factors of waste or economy. For example, sea salt is inexhaustible, and may be extracted by solar evaporation, which is a use of inexhaustible energy. Agricultural products are renewable, and their prodution chiefly requires the renewal energy of men and animals. But the smelting of metallic ores, as now conducted, involves the use of exhaustible material, both as ore and as fuel.

In most industries, however, the two sets of considerations are combined. Portland cement, for example, is made from inexhaustible substances, but is burned with exhaustible fuel. The latter factor in the industry, therefore, is the one to be carefully considered, while the first factor is negligible. Taking industry by industry we shall find that this condition of affairs is general, and that each one must be studied by itself with reference to its inexhaustible, reproducible, and exhaustible elements. In doing this a clear notion can be obtained as to the real needs of a given industry, and our attention can then be concentrated upon those features of it which particularly demand economy. We shall be able to locate evils with greater accuracy; to diagnose the industrial diseases, so to speak, and then to look intelligently for remedies. Many of the remedies must be sought for along chemical lines of research, which will develop economical processes of manufacture, utilize materials that are now wasted, or substitute cheap for costly substances. Cheap and costly, however, are words which need qualification. A substance or a process which is cheap to-day may be in reality wasteful with a temporary reduction in price at the cost of some permanent economy. For our purposes the two words imply a deeper discrimination than is carried by their ordinary use. Tempo-

rary efficiency and cheapness are to be discountenanced, while permanent economy for the benefit, not only of the Nation, but of the whole human race, is to be encouraged. This principle is sound, but its practical applications will involve many difficulties, and develop many conflicts with special interests. Like all ideals it cannot be realized absolutely, but it represents a standard of action toward which we must move, even though the ultimate goal of perfection may never be attained. Evils can be mitigated, although they may not be entirely removed.

THE PRESIDENT FOR CONSERVATION

President Taft, on April 30, addressed a letter to Mr. A. W. Shaw, editor of *System*, which has been made public. It reads:



WHITE HOUSE,
WASHINGTON.

April 30, 1909.

My dear Mr. Shaw:

The conservation of National resources is a subject which will properly claim from the present administration earnest attention and appropriate legislation. The necessity for a comprehensive and systematic improvement of our waterways, the preservation of our soil and of our forests, the securing from private appropriation the monopolies power in navigable streams, the retention of the undisposed of coal lands of the Government from alienation, - all these matters are vitally complete important to the people of the United States, and to your constituency, the business men of the country.

Without the resources which make labor productive, American enterprise, energy, and skill would not in the past have been able to make headway against hard conditions. Our children and their children will not be able to make headway if we leave to them an impoverished country. Our land, our waters, our forests, and our minerals are the sources from which come directly or indirectly the livelihood of all of us. The conservation of our natural resources is a question of fundamental importance to the United States now - to the business man to-day.

Very sincerely yours,

Wm. H. Taft

Mr. A. W. Shaw,
Editor, "System,"
Chicago, Illinois.

ORGANIZATIONS WHICH HAVE PASSED RESOLUTIONS FAVORING THE ESTABLISHMENT OF THE APPALACHIAN NATIONAL FOREST

Adirondack Murray Memorial Association.
American Civic Association.
American Cotton Manufacturers' Association.
American Forestry Association.
American Institute of Electrical Engineers.
American Mutual Newspaper Association.
American Society of Civil Engineers.
Appalachian National Forest Association.
Asheville, N. C., Board of Trade.
Association for the Preservation of the Adirondacks.
Board of Trade, Charleston, W. Va.
Board of Trade, Columbus, Ga.
Board of Trade, Columbus, Ohio.
Board of Trade, Elkins, W. Va.
Board of Trade, Grand Rapids, Mich.
Board of Trade, Greenville, S. C.
Board of Trade, La Crosse, Wis.
Board of Trade, Nashville, Tenn.
Board of Trade, Savannah, Ga.
Board of Trade, Winston-Salem, N. C.
Board of Trade, Providence, R. I.
Business Men's Club of Huntsville, Ala.
California Promotion Committee (in convention at Petaluma).
Carriage Builders' National Association.
Chamber of Commerce, Atlanta, Ga.
Chamber of Commerce, Augusta, Ga.
Chamber of Commerce, Belton, S. C.
Chamber of Commerce, Boston, Mass.
Chamber of Commerce, Charleston, S. C.
Chamber of Commerce, Chattanooga, Tenn.
Chamber of Commerce, Columbia, S. C.
Chamber of Commerce, Cleveland, Ohio.
Chamber of Commerce, Los Angeles, Cal.
Chamber of Commerce, Newberry, S. C.
Chamber of Commerce, Parkersburg, W. Va.
Chamber of Commerce, Pittsburg, Pa.
Chamber of Commerce, Raleigh, N. C.
Chamber of Commerce, Sumter, S. C.
Commercial Club, Mobile, Ala.
Commercial Club, Montgomery, Ala.
Commercial Club, Louisville, Ky.
Colorado State Forestry Association.
Connecticut General Assembly.
Connecticut Lumber Dealers' Association.
Convention for the Extension of Foreign Commerce.
Counties Committee of California Promotion Committee.
Engineering Society of the Carolinas.
Daughters of the American Revolution, National Society.
Eastern States Retail Lumber Dealers' Association.
Federation of Women's Clubs, D. C.
Federation of Women's Clubs, Grand Rapids, Mich.
Federation of Women's Clubs, Toledo, Ohio.
Forestry Association and Women's Clubs, Paducah, Ky.
Forestry Club, University of Michigan.
Gadsden Commercial and Industrial Association, Gadsden, Ala.
Greater Charlotte Club, Charlotte, N. C.
League of Improvement Societies in Rhode Island.
Manti National Forest.
Manufacturers' Club, High Point, N. C.
Merchants' Association of New York.
Merchants and Manufacturers' Association of Milwaukee.
Michigan Agricultural College.
National Association of Manufacturers.
National Association of Box Manufacturers.
National Association of State University Presidents.
National Association of Cotton Manufacturers.
National Board of Trade.
National Hardwood Lumber Association, Atlantic City.
National Lumber Manufacturers' Association.
National Slack Cooperage Manufacturers' Association.
National Wholesale Lumber Dealers' Association.
New Century Club, Detroint.
New England Cotton Manufacturers' Association.
New York Board of Trade and Transportation.
North Carolina Legislature.
Pennsylvania State College, Faculty of School of Agriculture.
Pomona Grange of Oregon.
Public Meeting, Alma, Mich.
Public Meeting, Detroit, Mich.
Public Meeting, Jackson, Mich.
Public Meeting, Muskegon, Mich.
Public Meeting, Springdale, Conn.
Public Meeting, Wausau, Wis.
Rhode Island Institute of American Architects.
Science Club of University of Wisconsin.
Trinity College, Durham, N. C.
United States Hay Fever Association.
West Virginia State Board of Trade.
Women's Club, Bay City, Mich.

Women's Club, Eau Claire, Wis.
Wofford College Lyceum, Spartanburg, S. C.

As a further indication of the extent of interest in Appalachian-White Mountain legislation, the following list may be added:

List of Delegates to Congressional Hearing for Appalachian-White Mountain National Forest Reserve Before Committee on Agriculture, House of Representatives, Jan. 30, 1908.

APPALACHIAN NATIONAL FOREST ASSOCIATION

Ligon Johnson, President.
John H. Finney, Secretary and Treasurer.
R. Gordon Finney, Assistant Secretary.

STATE OF GEORGIA

Hon. Hoke Smith, Governor of the State.
Maurice W. Thomas, Atlanta.
Asa G. Candler, Atlanta.
Joel Hurt, Atlanta.
Sam D. Jones, Atlanta.
Maj. John S. Cohen, Atlanta.
W. G. Cooper, Atlanta.
Hugh M. Willett, Atlanta.
Harvie Jordan, Atlanta.
Will H. Shippen, Atlanta.
Isaac Haas, Atlanta.
R. J. Griffin, Atlanta.
F. L. Seeley, Atlanta.
Ralph Smith, Atlanta.
Oscar Pappenheimer, Atlanta.
John S. Corrigan, Atlanta.
Forrest Adair, Atlanta.
E. F. Morgan, Atlanta.
J. J. Spalding, Atlanta.
F. H. Hadley, Atlanta.
B. M. Hall, Atlanta.
A. H. Colcord, Atlanta.
A. M. Whaley, Atlanta.
Walter P. Andrews, Atlanta.
Samuel Dunlap, Atlanta.
J. H. McGowan, Augusta.
Oswell R. Eeve, Augusta.
Bowdrie Phinizy, Augusta.
Thos. W. Loveless, Augusta.
I. T. Hickman, Augusta.
W. E. Small, Macon.
W. E. McCaw, Macon.
T. J. Simmons, Macon.
W. A. Little, Columbus.
Fred B. Gordon, Columbus.
Gunsby Jordan, Columbus.
Leo Lowenherz, Columbus.
W. C. Bradley, Columbus.
J. D. Massey, Columbus.
Linton A. Deane, Rome.
Barry Wright, Rome.
Seaborn Wright, Rome.
J. Lindsay Johnson, Rome.
W. F. Dorsey, Athens.
Frank Shackleford, Athens.
Paul Gilreath, Cartersville.
Paul Akin, Cartersville.
C. P. Goodyear, Brunswick.
H. H. Dean, Gainesville.
John A. Smith, Gainesville.
H. A. Meikleham, Lindale.
A. S. J. Stovall, Elberton.
A. M. Kitchins, Cornelia.
Luke E. Tate, Tate.
Charles Barret, Union City.
J. S. Adams, Demorest.
Dr. Jeff Davis, Toccoa.
Dr. L. G. Hardman, Commerce.
Smith D. Pickett, Albany.
Claude N. Bennett, Thompson.

STATE OF VIRGINIA

Rorer A. James, Danville.
R. P. Barham, Petersburg.
S. S. Nottingham, Norfolk.
J. H. Lindsey, Charlottesville.
A. McG. Griggs, Portsmouth.
C. E. Thacker, Newport News.
M. H. Claytor, Roanoke.
John S. Bryan, Richmond.

STATE OF WEST VIRGINIA

W. B. Matthews, Charleston.
Col. C. B. Kefauver, Parkersburg.
R. B. Naylor, Wheeling.
L. J. Corbly, Huntington.
Hugh Shapps, Bluefields.
L. C. Lough, Fairmount.
Prof. M. S. Hodges, Morgantown.
Hon. Harvey W. Harmor, Parkersburg.
Hon. Stewart W. Walker, Martinsburg.
Howard Sutherland, Elkins.
Director James H. Stewart, Morgantown.
Prof. Henry S. Green, Morgantown.
Hu Maxwell, Washington, D. C.
Hon. Geo. C. Sturgiss, Washington, D. C.
Hon. W. P. Hubbard, Washington, D. C.
Hon. Jos. H. Gaines, Washington, D. C.
Hon. Harry Woodyard, Washington, D. C.
Hon. James A. Hughes, Washington, D. C.
Hon. S. B. Elkins, Washington, D. C.
Hon. N. B. Scott, Washington, D. C.
Secretary J. B. Garvin, Charlestown.
Isaac T. Mann, Bramwell.
Amos Bright, Sutton.
William D. Ord, Landgraff.
Col. Edward O'Tolle, Gary.
Hon. S. W. Willey, Hinton.
Hon. H. I. Shott, Bluefield.

STATE OF SOUTH CAROLINA

Prof. A. C. Moore, Columbia.
Dr. J. A. B. Scherer, Newberry.
W. C. Woods, Darlington.
James F. Neville, Walhalla.
E. H. De Camp, Gaffney.
Thomas A. Ratliff, Anderson.
H. N. Snyder, Spartansburg.
Prof. B. E. Geer, Greenville.
Hon. A. C. Kaufman, Charleston.
Executive Committee from South Carolina, E. J. Watson, Columbia, S. C.

STATE OF NORTH CAROLINA

J. P. Lucas, Winston-Salem.
W. I. Underwood, Greensboro.
Benj. Bell, Wilmington.
James H. Caine, Asheville.

James A. Robinson, Durham.
J. J. Fariss, High Point.
Geo. B. Crater, Raleigh.
E. R. Preston, Charlotte.
John T. Patrick, Wadesboro.
Wade H. Harris, Charlotte.
W. S. Lee, Charlotte.

STATE OF KENTUCKY

W. H. Mackoy, Covington.
Robt. A. McDowell, Louisville.
Col. J. B. Atkinson, Earlington.
A. T. McDonald, Louisville.
Frank H. Hartwell.
Geo. A. Newman, Louisville.
Prof. H. T. Brownell, Louisville.
W. E. Burk, Louisville.
Professor Marks, Louisville.
Webster Gazley, Louisville.
J. M. Johnson, Louisville.
Frank H. Miller, Louisville.
Lafon Allen, Louisville.

STATE OF ALABAMA

Hon. J. H. Wallace, Alabama Forestry Commission.
Hon. J. A. Wilkinson, Alabama Forestry Commission.

STATE OF TENNESSEE

L. C. Glenn, Vanderbilt University, Nashville.
Saml. B. Smith, Chattanooga.

NEW ENGLAND STATES

Philip W. Ayres, Forester, Society Protection of New Hampshire Forests; Forester Dartmouth College grant.

Henry A. Barker, Department Vice-president "Public Reservations," American Civic Association, representing mayor of Providence, Providence Board of Trade, and League of Improvement Societies in Rhode Island.

Robert P. Bass, New Hampshire Forestry Commissioner.

George Ward Cook, Haverhill, Mass., representing interests in the Merrimac Valley.

F. B. Davis, Lawrence, Mass., lumber manufacturer.

Thomas H. Dearborn, Concord, N. H., state entomologist.

C. F. De Forest, New Haven, Conn., representing Connecticut Lumber Association and state of Connecticut.

F. C. Dumaine, treasurer Amoskeag Manufacturing Company, of Boston.

Charles L. Elwell, Concord, N. H., recently speaker house of representatives.

R. E. Faulkner, Keene, N. H., New Hampshire Forestry Commissioner.

G. W. Field, Chairman Commission on Fisheries and Game, Boston.

Charles M. Floyd, Manchester, N. H., governor of New Hampshire.

C. C. Goodrich, Hartford, Conn., manager Hartford and New York Transportation Company.

H. S. Graves, New Haven, Conn., Yale Forest School and state delegate.

James P. Gray, Boston, hydrographic engineer, president Boston Manufacturers' Insurance Company.

M. J. Hapgood, Peru, Vt., representing the governor and State Forestry Association.

Henry R. Hayes, representing Stone & Webster, electrical engineers, 147 Milk Street, Boston.

E. F. Hitchins, Waterville, Me., state entomologist.

D. Blakeley Hoar, Brookline, Mass. Appointed by governor of Massachusetts.

Prof. John G. Jack, forest department, Harvard University.

Harlan P. Kelsey, Salem, Mass., vice-president department of nuisances, American Civic Association, president Civic League of Salem, Mass.

Lieutenant-governor Lake, Hartford, Conn.

A. E. Lang, Cornish, N. H.

George B. Leighton, vice-president American Civic Association, Monadnock Farms, New Hampshire.

Arthur Low, Fitchburg, Mass., president Park Hill and Lancaster Manufacturing Companies. Appointed by governor of Massachusetts.

J. Horace McFarland, Harrisburg, Pa., president American Civic Association.

Hon. John McLane, ex-governor of New Hampshire, Milford, N. H.

William A. Martin, Holton, Me.

George F. Mead, Boston, Boston Fruit and Produce Exchange and Boston Associated Board of Trade.

Rev. Daniel Merriman, 12 Bay State Road, Boston. Appointed by governor of Massachusetts.

F. W. Rane, state forester, State House, Boston, Mass. Appointed by governor of Massachusetts.

F. Gardner Richards, Rockport, Mass.

Frank W. Rollins, ex-governor of New Hampshire, president Society for Protection of New Hampshire Forests.

Harvey N. Shepard, Boston, representing Commonwealth of Massachusetts, Massachusetts State Board of Trade, Appalachian Mountain Club.

Edwin A. Start, secretary Massachusetts Forestry Association, representing that association and Commonwealth of Massachusetts.

Dr. M. F. Sullivan, president of the Board of Trade of Lawrence, Mass.

Dr. George F. Swain, professor of civil engineering Massachusetts Institute of Technology, member Boston Transit Commission, representing state of Massachusetts.

James P. Tolman, Boston, Mass. Appointed by governor of Massachusetts.

Justin E. Varney, Lawrence, Mass., cashier Bay State National Bank.

C. J. H. Woodbury, Boston, secretary National Cotton Manufacturers' Association. Appointed by governor of Massachusetts.

Charles T. Woods, director Maine Agricultural Experiment Station, Orono, Me.

EDITORIAL

Edward Everett Hale

AGAIN, "a prince and a great man is fallen in Israel." Another national figure—"the Tolstoi of America" —has gone from us. One of the cluster of great New England names, including Wendell Phillips, William Lloyd Garrison, Ralph Waldo Emerson, Webster, Holmes, Lowell, Longfellow, Sumner, Whittier, Freeman Clarke, Phillips Brooks, and Thomas Wentworth Higginson, he was almost "the last leaf upon the tree."

While, considering his advanced age of eighty-seven years, the death of Edward Everett Hale should not perhaps have been such, it was, nevertheless, a surprise to the country.

The public press abounds with stories of his life, and commendations of his multiplied services to humanity. Fuller mention may be made in a later issue of CONSERVATION. Here it is in order to say that he was for years an active worker in the cause of forestry and conservation—the patriarch of the movement. No face was more familiar at the meetings of the American Forestry Association, nor at hearings before congressional committees; and no words were listened to with more consideration than his, as he told of the great pine trees, tall and beautiful in the days when North America was discovered—trees under which as a boy he had slept, but which in recent years had been swept away, their places now being supplied with sumac and blackberry bushes. Of such a sight he would say, "It makes a man cry to see it!"

At the last two annual meetings of the American Forestry Association Doctor Hale was present and spoke with tremendous energy and earnestness for the forestry movement and especially for the Appalachian measure.

In the very heart of the White Mountains of New Hampshire, where he loved to summer, a large mountain has, in recent years, been named for him.

To many of our readers the following quotation, from the *Springfield Republican,* will appeal as peculiarly appropriate and suggestive:

"His presence will never be forgotten by any one who had seen and listened to him in the last thirty years at least, as he grew old and the great head with its mane of brown hair, his deeply lined countenance, his slightly stooping shoulders and his large aspect as a personality impressed every one. A man of simpler, sweeter, honester manner will never be seen in pulpit, in assembly, or on the street. No one will forget him who has lived in his day."

And the following telegram from President Taft to the Hale household is one in which many will be glad to join:

"Mrs. Taft and I extend to your our heartfelt sympathy in your great sorrow, and deeply regret the loss which the whole community suffers in the death of such an upholder and stanch advocate of sweetness and light, the liberal but truly religious spirit, Christian charity and tolerance, the brotherhood of man, and the fatherhood of God."

❦ ❦ ❦

Forestry a Germ of the Conservation Movement

THE "Proceedings of the Conference of Governors of the United States" (White House, May 13-15, 1908) has recently appeared. It begins with a statement of the "origin and plan of the Conference." Following are the opening paragraphs:

"The idea of conserving the Nation's

resources arose partly from the recent forestry movement, partly from the still more recent waterway movement.

"The germ of the idea took form in an address by President Roosevelt before the Society of American Foresters (of which he was and is an associate member), March 26, 1903."

Following the above are several quotations from important utterances of President Roosevelt.

As has already been pointed out in these columns, the conservation movement has now taken a wide sweep, and when representatives of the different nations of the world shall meet at The Hague next September, as a result of President Roosevelt's initiative at the North American Conservation Conference held in Washington last February, this effort will have attained a world-scope.

To the little band of forestry pioneers who, in 1882, met in Cincinnati and organized the American Forestry Association, there is cause for profound congratulation as they behold the mighty tree now growing from the little seed then and there planted. Then, they were but blazers of a trail through a wilderness, leaders of an apparently forlorn hope, "hobby-riders," "alarmists," "cranks." Now, they have in their company official representatives from all the leading nations of the world. With another pioneer on a notable occasion they might with propriety exclaim, "What hath God wrought!"

❦ ❦ ❦

Let Us Hear from the Schools

A HOPEFUL aspect of the conservation movement is the development of the forestry schools. Of these a considerable number already exists. This number is increasing and the quality of the schools is improving. They are leavening public sentiment and preparing young men for various aspects of forest work.

CONSERVATION desires to keep in touch with these institutions. It believes that a close connection between the schools and the magazine will be good for both and for the movement. It desires news notes from the schools regarding their work, plans and prospects, and articles from their professors. All these schools are now looking forward toward the beginning of the coming year. CONSERVATION suggests that it might be helpful to them to keep their work before its readers.

❦ ❦ ❦

A Legislative News Bureau for Conservation

IT IS the desire of CONSERVATION to publish a record, as full as possible, of all national and state legislation on forestry and conservation matters. The endeavor will be made to treat with particular fullness such measures as may be introduced into the National Congress, to publish roll-calls on all important measures, and place the records of members directly before the country. It is highly desirable, furthermore, that a similar record may be kept of legislative procedure in the several states. That this effort may prove effective, it is essential that friends of the conservation movement shall furnish this magazine each month with the information necessary. In numerous instances friends reside in state capitals; in cases, they are themselves members of state legislatures. They are thus in peculiarly favorable positions to aid this publication in making a success of the proposed news bureau. With their aid it can become a highly important factor in the promotion of legislation necessary for the conservation of the resources of the states and Nation. CONSERVATION, therefore, calls for volunteers in every state in the Union to supply the necessary data. Whether legislatures be or be not now in session, prompt, affirmative replies will be greatly appreciated, that records may be begun and this office may know to whom to look for the necessary information.

❦ ❦ ❦

The Point of View

THIS office has received an illustrated clipping describing an endless-chain crosscut saw. The clipping says: "The

endless-chain crosscut saw herewith shown is interesting as an invention for which much is claimed. Driven by a thirty horse-power gasoline engine, the saw travels at a speed of 2,000 feet per minute. It is said that it will fell a tree eight feet in diameter in less than fifteen minutes, and crosscut a log section in eight minutes. The machine sits on a turntable, and can be swung to cut in all directions and angles without moving the sled upon which it rests."

With this clipping comes the inquiry from a correspondent, "Do you use your influence in preventing the patenting and adoption and use of any such devil of destruction as would be inferred from the enclosed slip?"

In CONSERVATION for June was published an editorial containing a letter from a lumberman. A comparison of that letter with the one above will suggest to our readers the different viewpoints taken on the forest question, all of which, with its varied clientele, must be considered by CONSERVATION.

To our last correspondent we answer:

CONSERVATION, and the organization and movement it represents, do not object to improved machinery, whether for lumbering or for any other useful purpose. Time was when improved machinery was looked upon as an enemy, if not of the human race, at least of that section of it represented by the laboring class. Some of these, in England, for example, organized themselves under the leadership of one Ludd, and went about armed with big sticks smashing looms. This view is now hopelessly out of date. If work is to be done and machinery can be used, let it be used; and the better the machinery the more cordially it should be welcomed.

That the introduction of improved machinery raises problems in connection with the labor question, none appreciate more keenly than the writer. The remedy, however, lies not in smashing the machinery, but in solving the labor question.

But suppose that, as in the case in hand, the machinery is to be employed for the harvesting of lumber. Is it not true, we are asked, that the forests are already being slaughtered at a frightful rate?

The answer is, Unquestionably they are.

And shall we, then, encourage the use of machinery which can facilitate that slaughter?

To which our answer, unhesitating and unequivocal, must be, Yes.

And how, then, does our position on this question consist with our position that forests should be conserved?

Following is our reply:

The forests are for use. Of their uses, two are conspicuous: 1, For harvesting; 2, For protection.

The abuse appears when the harvesting is unwisely done, as when trees too small to be cut are cut and when trees that should be preserved for protection purposes are harvested. The remedy must be sought not in impairing the processes of harvesting, but in seeing, first, that they are properly performed, and, second, that they are applied only to the trees that should be harvested and not to the trees that should be preserved.

And who shall exercise this supervision? Here we repeat our familiar declaration, that the community itself must take a hand in this matter. Individuals may do something, and associations, commercial or public-spirited, may do more; but the community, in its organized form as city, state or nation, or all together, must unquestionably assert and exert itself if the evil is to be avoided and the good conserved.

❦ ❦ ❦

Water-power Grabs in Wisconsin

IN LA FOLLETTE'S weekly magazine for May 22 is an article under the above heading by State Senator Winfield R. Gaylord, of Wisconsin.

Senator Gaylord notes the existence of the water-power trust against which President Roosevelt warned Congress and the country. He states that the water-powers of Wisconsin have been

conservatively estimated at 600,000 H. P. Each hydro-electric H. P. is estimated to equal about twelve tons of coal per year; the total, therefore, equaling 7,200,000 tons of coal per annum.

Of this water-power, the commercial value is suggested by such facts and figures as these: The bare location of one power site, with franchise, was sold for $10 per H. P., while another location is quoted at $9 per H. P. per annum.

In the paper and pulp hearing before Congress, on pages 1108 to 1112, Mr. Safford, engineer for the International Paper Company, said: "In New England, for the last twenty-five years, when power has been taken away from the owner by municipalities or by other companies, a fair price is about $1,000 per H. P. for the amount taken away. The average of thirty or forty sales of H. P. that I know of personally, most of which I have reported on, has been $300 per H. P." This power was conceded to be undeveloped.

On page 894 of the same hearing, Mr. Cowles testified that the paper mills at the Androscoggin River could sell their power at $40 per H. P. per annum.

On page 1030 of the same report, the official statement of the International Paper Company shows that they place a value of $50 per H. P. upon their undeveloped water-powers.

Obviously, in the light of such facts and figures, water-power is not a thing like air and sunshine, to be given away.

Furthermore, as Senator Gaylord points out, even such estimates of value may be slight in comparison with the value that these water-powers will assume in future years when wood and coal have largely failed and population, with its manifold needs, is vastly increased. In exactly the same way as city lands multiply in value with the multiplication of population, so these water-powers will probably multiply in value under the influences indicated.

In the light of these facts, we are not surprised that private companies are reaching out for such water-powers. At the present session of the Wisconsin state legislature nearly thirty bills were introduced asking for franchises for dams, while lobbyists thronged the corridors and committee-rooms pressing for these valuable privileges. An aggressive fight resulted, the end of which is not yet.

Senators who have opposed giving away the people's water-power properties point out, first, that the private companies do not adequately develop their water-powers, thirteen of the thirty franchises asked for having been covered by previous grants of the legislature but not developed; and second, that private development, as compared with public, is uneconomical. For example, in the case of the High Falls and Johnson Falls combination, the digging of a canal two and one-half miles long would give a combined head of 110 feet. The company, however, could not secure the riparian rights between these two points; the heads were, therefore, developed separately, with a waste of ten feet. The state, however, could secure the riparian rights and would avoid this waste.

In a paper before the American Society of Civil Engineers, in November, 1908, Mr. H. M. Chittenden, C.E., said: "When a power is planned or a reservoir built, it should be so planned from the start as to bring out its full possibilities. A private company can rarely do this. Generally its scheme does not require this, nor its resources permit; but a site once occupied by an inferior work may be perpetually barred from complete development. * * * Furthermore, the Government is building for all time, while the individual builds only for the immediate and near future. The case is similar to that of the landlord and tenant."

Like President Roosevelt, in speaking of the Desplaines River case (see CONSERVATION for March, page 170), and like President Taft in his letter to Mr. Shaw (see page 426, of this issue), Senator Gaylord takes his stand against donating these water-powers to corporations. His language is: "These

water-powers can be, and ought to be, held by the state, developed by the state, and their energy sold to such private persons as wish to use it. * * * Whatever is to be done with it, the state and the people of the state should keep control forever of these water-powers, which are the equivalent of so many coal mines, digging their own coal to the amount of over seven millions of tons every year."

The National Irrigation Congress

OF THE National Irrigation Congress, former President Roosevelt said: "This congress undoubtedly is one of the most important unofficial bodies in the country."

This congress meets annually. Its meeting this year will be held at Spokane, August 9 to 14, and promises to eclipse all former meetings in attendance and interest. The congresses are notable for the number and character of the delegates attending. Last year, for example, there were present the Vice-president of the United States, the governors of several western states, United States Senators, Congressmen, Government officials, state engineers of eight western states, scientific men, including experts of the United States Department of Agriculture, professors of state institutions, and editors of technical journals. This year the management expects from 4,500 to 5,000 accredited delegates from various parts of the United States, representatives from Canada, Europe, the South American republics, China and Japan, and President Taft, with several members of his Cabinet. On Governors' Day, August 13, governors of twenty-five states and territories are expected. Bankers, railroad presidents, scientists, experts on reclamation of arid and swamp lands, deep waterways, forestry, good roads, and home-building will have places on the program.

Among the speakers announced are James J. Hill, Gifford Pinchot, F. H. Newell, Dr. Geo. B. Angell, United States Senators Cummins and Jones, John Barrett, Director of the Bureau of American Republics, Governors Willson of Kentucky and Patterson of Tennessee, and other men of prominence. The cooperation and assistance of the United States Department of Agriculture, including the Forest Service, and the Reclamation Service, are promised.

Among the features announced are the following:

August 10, afternoon.—Parade of progress, showing the transformation of the Northwest from semi-savagery to civilization.

August 11, evening.—Illuminated parade of progress, representing various periods in the Northwest from 1805 to 1909. Indians from four reservations and districts in the Pacific and western states will join in this demonstration.

August 12, afternoon.—Parade and countermarch of the industrial and irrigation army, with 10,000 uniformed men in line. The official emblem of the congress, showing science bidding the desert drink, will be featured on an elaborate float.

A regiment from Ottawa, Canada, wearing the British uniform, is also expected. On August 9 the proceedings will be enlivened by the singing of the irrigation ode by a large chorus of trained singers, and the singing of state hymns by school children.

The avowed object of the congress is the familiar one: To save the forests, store the floods, reclaim the deserts, and make homes on the land.

Irrigation is gradually, even rapidly, making a garden-spot of the great American desert. The work, however, is but in its infancy, and congresses such as the one in question are potent factors in its promotion.

Reclamation is intimately connected with problems of vital moment to society. Present economic development is, in large measure, separating the citizen from the land. History records numerous like instances which, without exception, have brought trouble, sometimes peril, to the state. Agrarianism, whether in ancient Rome or in modern

Russia, is portentous. The attempt of the Gracchi to place landless men upon land largely unused brought civil strife. Modern civilization to-day faces congestion in great cities, and a problem of unemployment imperatively demanding solution. Upon the arid and semi-arid lands of western America, not to mention swamp lands easily susceptible of reclamation, are opportunities which might readily provide for millions of human beings, relieve economic pressure, and transmute discontent into satisfaction and acute misery into happiness. In this viewpoint, the reclamation of our western wilderness constitutes an appeal of the first order to the citizenship and statesmanship of to-day.

Mr. Arthur Hooker, secretary of the board of control, will present a resolution memorializing Congress to issue three per cent gold bonds, running 100 years, to the amount of $5,000,000,000, or as much thereof as may be necessary, for the following purposes:

One billion dollars for drainage of 100,000 square miles of overflowed and swamp lands.

One billion dollars for the irrigation of 40.000,000 acres of arid and semi-arid lands.

One billion dollars to construct and improve deep waterways.

One billion dollars for good roads and national highways.

One billion dollars for forest protection, reforestation, and conservation of the forest resources.

To provide the funds for the above-named projects, or any of them, other methods than those of bond issues might be conceived; furthermore, such an enterprise, because of its very magnitude, will impress some as chimerical. Nevertheless, it will be recalled that President-elect Taft, in his Belasco-theater speech, conceded the possible wisdom of bond issues for conservation purposes; furthermore, properly handled, such an enterprise might represent to the Nation not a mountain of debt, but a great and highly profitable investment, not only yielding large pecuniary returns, but, for years to come, promoting social and economic peace and tranquillity.

* * *

President Hill on Conservation

WISE words were those uttered by Mr. James J. Hill at the opening of the Alaska-Yukon-Pacific Exposition on June 1. "The idea of a federation of the world," said he, "comes near its realization in the great expositions that assemble actual evidences of man's progress in self-development and toward his development of the earth. This exposition may be regarded as the laying of the last rail, the driving of the last spike, in unity of mind and purpose between the Pacific Coast and the country east of the mountains. It is the witness of a constantly broadening tie which is both the price we pay for civilization and the boon that it confers upon us. * * * As it was the commonwealths of the Middle West and Northwest that, in their rise, swung the Nation, like a ship swaying with the tide, slowly but surely toward the ideals of freedom and union that have molded us to what we are, so it may well be that the destiny of the United States will be decided in some great crisis hereafter by the men, the wealth, the industry, the ideas to be born generations hence in the wide spaces, under the clear skies, amid the bracing airs of our giant child of the North that occupies the place of honor here to-day."

Speaking of the influence of the West, Mr. Hill said: "No less weighty should be its contribution to the formation of national ideals, the shaping of national ambitions, the direction of national policies. Out of the West have come formative impulses that enriched the history of the country. It is the goal of the enterprising and fearless. While others deliberate, it acts. While they count consequences, it looks upon results as already nearing accomplishment. If the star of empire in history has moved westward, it followed rather than led those bold spirits by which empires are made and upheld. Here, on

the westernmost verge of the continent, where progress must pause for a moment, like the early voyagers, before venturing across the broad Pacific to remake that Orient which beheld some of her earliest conquests, may well be exhibited in pronounced and admirable form the qualities that have always marked the American West."

Such language reveals in Mr. Hill a genuine son of the Republic—a man who has breathed the air of the prairies and the mountains; who knows something of the mighty sweep of our national domain and has felt something of the spirit that has made and is yet to make America great. Speaking of the exposition, Mr. Hill continues: "In its execution is the vigor of youth that should ripen into a splendid maturity. In everything is the magnificent self-confidence without which there can be neither great qualities nor great achievements. The Pacific Coast is drawn to a large scale. The mountains, the ocean, the distances; even the forms of sea and vegetable life are fixed on a generous plan. Such surroundings shou'd be incompatible with human pettiness. Man should emulate nature by growing into greatness of interest, purpose, thought and character. It would almost seem as if nowhere else could there be such inspiration from environment for the development of a worthy civic spirit, as well as for great material creations."

Passing to the question of natural resources, the speaker continued:

"The first and most imperative word, I need hardly say, one which the country has come to hear with much respect and not a little fear as to its future, is 'conservation.' I put it first, not only because it belongs there in the scheme of national politics, but because it particularly needs to be repeated and emphasized among the people of the North Pacific Coast. You have been following the footsteps of your ancestors farther east, who are now beginning, at great cost of labor and wealth, to repair the consequences of errors that still seem to you natural and proper acts. From California northward to the extreme of Alaska there are to-day probably more unimpaired natural resources than in all the rest of the country. Your great forests are falling; but so immense were they that man has not yet compassed their destruction. You have seen what happened to New England and to Michigan and to Wisconsin and Minnesota; what will be the condition of the South in a few more years?

"You still possess the principal supply of timber in the United States. Will you take steps to guard it, to prevent waste for the sake of immediate gain to a few individuals, until lumber shall become a luxury and the very poor must huddle in houses of mud or sod, like the peasantry of the Old World? If that argument does not appeal, will you consider the economic effect of the future decline and disappearance of what is now and might remain always one of your greatest industries? Will you realize what this country must become when stripped of its forests: the washing away of the soil, the inevitable changes in climate, the devastations of torrential overflow and disastrous drought, the barren bleakness of your mountains and the desolation of your valleys when the forests have gone? If you do, your earnest work for forest conservation will begin to-day."

As at the White House Conference a year ago, President Hill again called attention strongly to the importance of soil conservation. He said:

"It is on record that the best soil in this state produced, when the first settlers came, from forty to sixty bushels of wheat an acre. How many farmers get that now? The temptation is almost irresistible in a country like this, where the new soil needs but the touch of water to burst into wonderful fertility, to grasp a present profit without thought of the future. But this apparently exhaustless soil acts like all others when abused. Treat it as those of our older states have been treated, take away all and give nothing back, and it is only a question of time how soon your lands, too, will decline in productivity and re-

cover less readily than those which had less to lose. The procession of American farmers that have moved recently into the country just north of our western states should point the moral. They were wasters, or the children of wasters, who had exhausted nature's bounty and were moving on. Take care of your soil before it is too late, and it will take care of you and sustain and increase your prosperity forever. Neglect and waste it, and no earthly power can save you from the consequences."

Mr. Hill also called attention to the great salmon industry, capable of such splendid development on the coast, yet, like other industries directly dependent upon natural resources, already menaced by wasteful consumption. He called attention to the possible wealth of the West in water-power. Speaking of Alaska, he said: "Among its mountains and scattered through yours all the way down to Mexico there is water-power enough undeveloped to perform all the work done west of the Mississippi. Are these resources being guarded for posterity, or are they being so disposed of that their future employment will be conditioned upon the payment of a perpetual tax to their appropriators?"

It is a notable fact that the impressiveness of a sermon depends primarily not upon the text, nor even the matter, but upon the preacher. Others have said such things as Mr. Hill said on this occasion. From them, however, the warnings have too often been regarded as the mouthings of an alarmist, or the vain imaginings of a theorist. Not always, especially in America, have the words of the expert, the specialist, the man of science been accorded due weight. Here, rather, it is to the business man, the captain of industry, the successful man of affairs, that we have turned for advice and guidance. That Mr. Hill is such a man, no one can question. His utterances, therefore, upon such a question as that of the husbanding of our resources carry peculiar weight. It is to be hoped that they may be widely quoted, repeated, and reenforced until they have produced the conviction that influences conduct.

❦ ❦ ❦

Destruction of Fish

IN LINE with the warning given by President Hill to the people of the great Northwest regarding the destruction of their salmon, comes a warning from the East regarding a similar destruction of fish. Says the *New York Herald* in its issue of June 7:

"Here is the great Delaware River, once prolific in fish and making fertile its banks; to-day pollution of its waters by the waste of factories makes the surviving fish unfit to eat and menaces the health and comfort of those who live near. And the Government, ever paternal, proposes to restock the river with fish from abroad, while it does nothing to stop the pollution. The very repairing of loss is likely to prove a waste.

"Cases of much the same character could be found nearer home. In tidal waters, such as encompass this city, the results of pollution are much less serious, but the problem will be pressing before many decades."

The one discordant note in this editorial is that regarding the "paternalism" of the Government. With the evidence already piled mountain-high all about us, and daily climbing higher, that governmental "do-nothingism" is, throughout the civilized world, now out of date, and that governments in future must, at the least, earn their keep to justify their existence, the talk of "paternalism" has a strangely Rip Van Winkle-like ring.

Further, as has been already stated in these columns, the term "paternalism" has no place in speaking of the government of a republic. In an absolute monarchy, in which a Louis XIV can say, "I am the State;" can refer to the people of the nation as "his children," and treat them as such, the government may properly be spoken of as "paternal." Where, however, as in the France of to-day, and in the United States, the people have attained their

majority, dispensed with their "pater" and taken charge of their own affairs, it is as absurd to speak of their joint activities as "paternal" as it would be so to speak of the joint activities of a group of brothers who have gone into partnership. Antiquated terms often die hard. The term in question is no exception. Let all intelligent people, however, recognize that in the United States its day is past, and. hasten to lay it finally away to rest.

❦ ❦ ❦

Responsibility for Forests

IN AN editorial on June 11, the *New York Press* endorses a statement from the *Engineering News* that the "deforestation of this country cannot be adequately checked by the establishment of forest reserves by the Federal Government and the various states." "Public reserves," it declares, "and the Government encouragement of forest cultivation must be supplemented by the efforts of hundreds of thousands of individuals."

This declaration is in line with one made by Secretary Wilson at the last annual meeting of the American Forestry Association. As will be recalled, Secretary Wilson on that occasion said: "The American people can do a great many things without Congress; a very great many things." He then proceeded to urge individuals, associations and corporations to do their utmost toward conserving existing forests and establishing new ones. "Let us not," he said, "sit down and make faces at Congress because they will not buy these Appalachian and White Mountain ranges. * * * It does not prevent associations of men from taking hold and planting trees. It does not prevent the farmer from providing a legacy for the next generation by planting trees on the land that will not grow grasses or grains, but will grow trees."

Continuing, the editorial writer in the *New York Press* strikes a different note and says, "It has got to the pass now in this country that a man who plants a tree has a claim to be considered a public benefactor, while the man who wantonly destroys one is a public enemy.

"Individual responsibility for the preservation of the forests of the Nation has not been sufficiently impressed upon the public at large. There is needed in this respect not only a 'campaign of education,' but a campaign of repression. Those great forest fires which every year, from Maine to Texas and from Seattle to Florida, sweep away vast quantities of precious timber are generally the result of the actions of the careless, the mischievous, or the criminal. Surely, the forests are as worthy of protection as the game of the country, and guardians of the forest as necessary officers as game wardens; surely it is the duty of both state and Federal governments to see to it that adequate penalties are provided for the punishment of those who, through carelessness or wantonness, start forest fires."

Self-preservation is the first law of nature; likewise it is the first law of nations; and national life, like individual life, rests upon an economic base. If governments may not, by adequate pains and penalties, protect the foundations which underlie their very existence and that of the individuals who compose them, we may well inquire, "Why government at all?"

BACK NUMBERS WANTED

The office of CONSERVATION desires a few copies of the issues for May and September, 1899; January, February, and March, 1907, and November, 1908, for which it will pay twenty cents each.

Any having available copies will oblige by advising this office.

NEWS AND NOTES

Government to Study Eucalyptus Planting

Plans are being made to have a special study undertaken by a representative of the United States Forest Service in the near future to determine the feasibility of the culture of the eucalyptus tree in the lower Rio Grande Valley and along the Gulf Coast of Texas.

The importance of eucalyptus culture from a commercial standpoint in California has within the past few months aroused general interest throughout the country concerning these rapid-growing trees, and the district office of the Forest Service at Albuquerque receives almost daily inquiries as to the feasibility of planting eucalypts in the Southwest, particularly in the state of Texas.

Eucalypts are native to the coast region of Australia and Tasmania, where at least 150 distinct species are recognized. They were introduced into California about 1850, and first planted near San Francisco for ornamental purposes. The extremely rapid growth of certain species, their value for fuel, lumber, and special products have resulted in the undertaking of extensive investigations concerning the habits of these trees and their commercial uses and possibilities. Fully 100 species have been introduced into the United States.

The eucalypts are adapted to a subtropical climate, and the limits within which they may be planted for commercial purposes in this country may be broadly defined as that bounded by the frost-line. They are therefore adapted for planting in the warmer portions of California and in parts of southern Arizona and Texas. There is considerable area, however, in southern Texas where it is likely that the more hardy of the eucalypts can be successfully planted.

Timber Seasoning and Wood Preservation

In recent years the importance of preserving timber from decay by the use of various antiseptics has been generally recognized in the United States. The value of properly seasoning timber before such treatment is not so generally known, though it is one of the most important features of the treatment.

There are three main advantages to be derived from the proper seasoning of timber, namely: The increase in strength of the timber, the greater ease of injection of antiseptics for preserving the timber, and the saving in freight charges due to the decreased weight.

From thorough tests made by the Forest Service on various pieces of timber, it appears that thoroughly air-dry or seasoned timber has about double the strength of the green material. It is well-known to all operators of wood-preserving plants that antiseptics are not only difficult to inject into green wood, but that it is practically impossible to obtain a uniformly satisfactory treatment of such material at an economic cost, for the purpose of insuring a prolonged life.

The last item would at first seem too trifling to be worthy of discussion, but from data obtained only recently it appears that western yellow pine lost fifty per cent. of its green weight after three to five months' seasoning. This means a saving of fifty per cent. of the freight charges and a corresponding saving in the handling of the timber, and is therefore a far too important point to overlook.

Considering these three points, it will be seen that there is not only a material saving in the seasoning of timber, but also a proportionate increase in the value of timber as a structural material. The seasoning of timber is never an expensive operation, even when done artificially. In the southern parts of the United States, a satisfactory degree of seasoning could be obtained by exposure of the timber to the air for a period of three to six months. In some of the northern states, however, a somewhat longer period is necessary to secure satisfactory results.

Forest Conservation in Germany and the United States

Germany faced the same great timber supply problem early in the nineteenth century that the United States faces to-day, and in solving it developed heavy producing and well-administered forests which are models for the rest of the world.

A study of the systems of forest management and wood utilization in the two countries offers many interesting comparisons. The United States takes 260 cubic feet per capita annually from the forests; Germany uses but thirty-seven. In other words, this country is already using seven times as much timber per capita as is Germany.

American forests are now producing not more than twelve cubic feet per acre; German forests are producing forty-eight cubic feet per acre annually. Germany has reduced waste and consumption and increased production.

The United States has as rapidly growing trees and as good soil as Germany, and foresters say it is reasonable to think that this country will be just as successful as the European country in high per acre production when every owner of timberland gets down to proper conservation and development of his forest property. It is known that the United States must continue in the future, as in the past, to rely upon its own forests for the great bulk of wood which is used. Despite the introduction of many substitutes, it is not possible to conceive the time when it will be practicable to do without wood for many uses. Granting this, foresters say, it follows that as a Nation and as individual citizens everything possible must be done to put the forest land of this country upon a permanent productive basis.

The ultimate aim must be to cut no more from forests than they produce each year, and to make their yearly growth equal to the needs of the people. As in Germany, forest conservation in this country means just two things, first, the fullest possible utilization of the present supply of timber, which will make it last longer; and second, the handling of forest lands in such a way that succeeding crops of timber will be secured.

At present only about one-fifth of our standing timber is in public forests. This term is used to cover the National Forests, state forests, the timber on Indian and military reservations, and National Parks. These forests are being managed according to the principles of scientific forestry so far as funds available for their administration permit. While the extent of the public forests will undoubtedly be increased in the future, it is not likely that for a very long time to come they will contain even as much as half of the timber supply. Four-fifths of our forests are now owned by individuals, companies, or corporations. The manner in which these forests are handled is, therefore, of the utmost importance in conservation.

If the lumber industry in the United States is to live, it means that large manufacturers will have to protect and develop their forest property. The land must be lumbered with care, fire must be kept out, young growth protected, and every principle of forestry applied to the management of the land so that it will continue permanently productive instead of becoming a burned over and barren waste, as has been the case of the forest regions which have passed through periods of excessive destruction as the result of careless lumbering methods

Mr. Weyerhaeuser on Forest Taxation

The *Norfolk Virginian and Pilot* says editorially:

"It is not difficult to see the force in the argument of Frederick Weyerhaeuser, the western lumber king, that the policy obtaining in many of the states of taxing standing timber excessively has contributed and is contributing to forest exhaustion in this country. Such taxation, as Mr. Weyerhaeuser points out, both encourages the conversion of growing timber into lumber and discourages the replanting of denuded areas. This fact has long been recognized in Europe, where, as a general rule, timber is by law exempt from taxation until it has secured its growth and becomes suitable for lumber. It is also beginning to be appreciated here, as is evidenced by the action of some of the states in placing only a nominal tax on lands devoted to forest culture. Forest conservation and reforestation mean infinitely more than the preservation of a timber supply. They mean conservation of many other natural resources of incalculable value as well. The state's duty is, therefore, not only to encourage timber growing, but even to compel and supervise it if necessary."

❦ ❦ ❦

Taxing a Forest Grant

An attempt to place on the tax rolls lands in the forest reserves subject to the Government grant to the Northern Pacific Railway Company will be made by the Tax Commission of the state of Washington this year in all probability.

The condition of the railroad grant in the forest reserves was called to the attention of the commission recently by the filing in Snohomish County of deeds from the railway company to individuals for four valuable quarter sections of timber land in the Forest Reserve. These deeds contained indefinite descriptions of the land, in that giving the section, township and range, the numbers were "subject to Government survey." The lands have not yet been surveyed.

The assessor of that county has been instructed by the commission to place the four quarter sections on the tax rolls and it is expected a lawsuit will result which will determine the taxable character of such timber.

The grant to the company was of each alternate section of land for twenty miles on both sides of the right of way.

When the forest reserves were designated the railway company was given the option of accepting scrip for lands in its grant and taking up lands elsewhere. It is declared that for sections of little value the company has taken scrip, but has retained the more valuable timber lands. The fact that the tak-

ing of scrip for lands in the forest reserves was made optional is looked upon by the Tax Commission as conclusive that the grant from the Government was absolute. This theory is further strengthened by the deeding of unsurveyed railroad lands within the forest reserves by the company to individuals.

The area of timber land involved, it is said, will be enormous, and if the Tax Commission is successful the result will be a big addition to the assessed valuation of property owned by railway companies in Washington.—*Portland Oregonian.*

Government Encouraging Willow Culture

The Government is right in the midst of the harvest of a most unique crop at its experimental farm near Arlington, just across the Potomac from this city, where a corps of laborers in charge of trained foresters are preparing for the annual free distribution of 100,000 basket willow cuttings.

Uncle Sam is encouraging the growing of high-grade willow rods in this country, and in the five years since the establishment of the holts at Arlington approximately a half million select cuttings have been distributed among farmers, with directions for planting and preparing for market. Particular attention is given to selecting the varieties and strains best suited to the soil where the plantings will be made.

Willow craft is an industry which is constantly growing in importance in this country, yet the culture of basket willow in the United States made very little progress until five or six years ago. Even now, practically all of the best grades of basket willow are imported from Europe, chiefly from France. Experiments have shown that the best grades of willow can be grown in this country at a good profit.

This year's harvest began early in March. Four approved varieties are being sent out, and only the best and most thrifty rods are selected for distribution. The management of the holts and work of free distribution of cuttings is charged to the United States Forest Service. Cuttings for experimental planting and information on management of the willow holts are furnished those who make the request of the Forester at Washington.

The Government recognizes the importance of good cuttings, a point more commonly overlooked than the matter of cultivation. Only the best and most thrifty rods are selected for each season's distribution.

Cuttings of new and untried basket willows were obtained from Europe a year ago and planted in the Service's experimental ground.

The Forest Service is receiving a constantly increasing number of requests for basket-willow cuttings. These requests come from farmers all over the country, many of them coming through members of Congress. The Service is endeavoring to stimulate the basket-willow industry in this country by distributing cuttings of the most approved varieties of willow and the four varieties tested for the last five years in the experimental holt at Arlington, Va., can now be confidently distributed.

Seasoning Eucalyptus Poles

The Government has undertaken a study to determine the proper method of seasoning eucalyptus poles, particularly those cut from trees which, owing to a large number of knots, will not make clear lumber. Such poles have shown a tendency to check and warp after being cut, probably due to improper methods of seasoning, which has been a great obstacle to their more extensive utilization.

Experiments will be carried on by the United States Forest Service to determine the method of seasoning which will prevent this checking and warping. One series will be conducted on the Sutro Estate which is in the fog belt, and another on the Pacific Land Investment Company's holdings at Newark, which is out of the fog belt.

Forty-eight growing trees, thirteen inches in diameter and having a clear length of thirty-four feet, will be selected and marked by an officer of the Forest Service. These two groups will be handled in the same way, twelve trees of each group are to be girdled and allowed to die and season standing, with the bark on, and the other twelve will be felled and laid on skids in the open and seasoned in this manner. Six of the twelve felled trees of each group will be peeled, and the other six, will be left with the bark on.

The skids will be so constructed that the poles will be at least one foot from the ground to allow a free circulation of air. The poles will be left on the skids for from six to eight months, and observations taken as to checking, warping, shrinkage, and loss of weight. The same observations will be obtained from the standing poles, with the exception of the weight.

When a sufficient period of seasoning has elapsed, determined by the weight of the skidded poles, the standing poles will be cut and their weights found. The condition of these poles will then be compared with the condition of the skidded poles, and a proper method of seasoning outlined which will be available to all interested in the use of eucalyptus timber.

Forest Resources of South America

The forests of South America are principally tropical, but in the Andes Mountains and the southern end of the continent are found forests of a temperate and sub-arctic

character resembling somewhat those of the United States and Canada.

The tropical forests are totally different from our north woods. There are no solid stands of single species or even of a few mixed species. Instead, hundreds of kinds of trees grow thoroughly mixed and scattered through the whole forest. This is one of several reasons that make logging in tropical forests so expensive and often unprofitable.

Rubber hunters have explored nearly the whole tropical forest in search of that necessary article of commerce, but aside from that South American forests have only been cut into for a few miles back from the coast and the principal ports and rivers. Even in this area only the species at present most valuable for commerce have been thus far cut, for example, cedar, mahogany, rosewood, lignum-vitae, fustic, and ironwood. Railroads, where they exist, charge such exorbitant freight rates that they have not much encouraged exploitation of the forests. In addition to this, the sparsity of population and lack of labor have also retarded development of the forests.

Most of the woods growing in these tropical forests are very heavy, hard, and rich in color. Greenheart is so hard that it nicks the axes of the choppers and will last for over 100 years in water.

Growth is so luxuriant and rapid that ruins or abandoned farms are promptly covered with a dense young growth of trees and vines that in a few years obscures the marks of civilization. The great forest of the Amazon basin is 1,100 miles long east and west by 750 miles north and south. It covers nearly a million square miles in Brazil. But as it lacks construction timbers it cannot be looked to for relief from the approaching scarcity in that kind of wood.

This Amazon forest presents the usual features of tropical growths, a tangle of vines weaving the great trees together and obscuring the sky, and leaves hanging from the branches like ropes, while underneath is a snarl of shrubs and creeping plants in which are hidden many species of fibrous plants and cacti with their sharp stings and thorns.

The tropical American woods are peculiarly adapted to withstand the ravages of insects and climate. In Paraguay, timbers of lapacho and quebracho which were used by the Jesuits in constructing their missions, are still well preserved in the ruins. In contrast to this, our own North American woods, which are so extensively imported for construction in South America, rapidly decay and are eaten by insects.

Just as in this country, not only in the old days but even to-day on the frontier, so also in South America in Colombia, Chile, and other states, the forests are cut down and burned, to clear land for agriculture.

The transportation difficulties in the mountainous countries are so great that the cities of the west coast depend wholly upon imports, chiefly from the United States, for their lumber. Their own mountain forests, which are reported to be very extensive and valuable, are inaccessible.

In Colombia at least the Australian eucalyptus has proven a vigorous grower, just as it has done in California. The American consul at Bogota reports that this tree reaches merchantable size in twenty to twenty-five years without cultivation.

Over-cutting of Connecticut's Forests

It has been estimated that the amount of wood annually consumed in the United States at the present time is 23,000,000,000 cubic feet, while the growth of the forest is only 7,000,000,000 feet. In other words, Americans all over the country are using more than three times as much wood as the forests are producing. The figures are based upon a large number of state and local reports collected by the Government and upon actual measurements.

The state forester of Connecticut, in a recent report, has given figures on growth and use for New Haven County, which give many more valuable details than are generally to be obtained, and well illustrate how the forest is being reduced by overcutting. In this county a very careful study was made on each township of the amount of forest, the rate of growth, and the amount of timber used. For the year 1907 the timber used was 120,000 cords, in the form of cordwood, lumber, ties, poles, and piles. The annual growth on all types of forest land, including the trees standing on abandoned fields, for the year, reached a total of 70,000 cords. Thus the amount cut yearly exceeds the growth by 50,000 cords.

The amount of standing timber considered as merchantable and available for cutting within the next few years was found to be 1,200,000 cords. Each year the annual growth increases the supply on hand by 70,000 cords, while the use decreases it by 120,000. The net reduction is, therefore, 50,000 cords a year. If the cut and the growth remain at the present figures, the supply of merchantable timber will be exhausted in about twenty years. At the end of that time there will be a large amount of forest standing in the county, but it will be in tracts under forty years of age, containing wood below the most profitable size for cutting. Cordwood could still be cut, but supplies of the most profitable products, like ties and lumber, would be practically exhausted.

Connecticut's case illustrates what is meant when the exhaustion of the timber supply is spoken of. It does not mean that

every tree will be cut and that the ground will be bare. It means, on the other hand, that year by year the people of the country are cutting more timber than the forest grows, and that within a comparatively short time the continued loss will have so reduced the forest that it will be difficult and expensive to obtain timber of useful size in sufficient quantity.

Fire Waste Through Carelessness

Mr. C. M. Goddard, president of the National Fire Protection Association, says, in the *Insurance News*, of Philadelphia:

"A cigarette thrown into a bale of cotton, loss $30,000; using a highly inflammable fluid for cleaning by open flame artificial light, loss $150,000; improperly set hot-air furnace, loss two lives and $75,000; sparks from a locomotive near a wood-working plant, loss $750,000; smoking cigarettes while spreading rags, loss $13,000,000.

"All of these instances occurred within less than a year and within a circle of 100 miles radius. Fires are carelessly started in the woods, and for weeks this fall our forests were burning at the rate of a million dollars a day.

"Our average annual fire loss for the past six years has been $250,000,000, and it is a conservative statement that fifty per cent. of this loss, or $750,000,000 during the six years, was due to easily preventable causes; that is, carelessness.

"We are not only the most careless, but the most reckless nation on earth, we live for the present, rather than for the future. We tolerate conditions, in our goodnatured way, that would not be allowed in Great Britain, Germany, or France. To this characteristic of the American people is due the fact that we lead the world in the loss of life and property from carelessness, for it is a regrettable fact that the large majority of our so-called accidents are due to mismanagement or blunders."

He states that the National Fire Protection Association is endeavoring to correct this evil by means of an educational campaign and adds:

"Why should we allow the manufacture and sale of the parlor-match, which is known to annually destroy millions of property and over 500 lives in this country, when the use of properly made safety-matches would prevent this loss?

"Of what use is it to 'conserve our natural resources,' about which so much is being said and done, if we make no effort to conserve our created resources—that is, our natural resources after we have spent time and labor on them to fit them for our use?

"I believe there is no more important problem before this nation to-day than that of reducing our annual fire loss, which is nearly ten times that of other civilized nations.

"Fifty per cent. of the fire waste in this country is due to carelessness."

Needless Work Is Waste

Says the *San Francisco Chronicle:*

"The conservation movement has not assumed a very radical form. In order for it to achieve a real success it will have to hammer into the minds of the American people, and, for that matter, the minds of the people of other countries, that there is much waste which is disguised by the appearance of gain. It is as wasteful to burn coal to carry cotton to be manufactured in countries where the textiles are not used as it is to burn it to no end at all. Manufactures should be conducted as near as possible to the source of the supply of the raw material and power, and to the people who will consume the finished product."

Two Projects in Eastern Oregon

Says the *Portland* (Oreg.) *Journal:*

"Surveyors and engineers have been ordered into the field to complete surveys and estimates for the Malheur government irrigation project. A surveying party is being formed at Boise by F. E. Weymouth, supervising engineer of this reclamation district. Secretary of Interior Ballinger has announced that he wishes the survey hastened sufficiently to permit his personal inspection and investigation when he comes West in June, at which time he will visit the project. He has signified his purpose of completing the work at once.

"The protest filed by private interests against the building of the Government project was heard in Washington, at which time Secretary Ballinger stated it was the policy of the Government not to interfere with private projects, provided private interests can show they are financially able to complete the work.

"He also stated that before the Government would concede that private parties have an interest in the Malheur project, they must show decisively they can complete it and at a reasonable cost, and that the people want a private project.

"It is now possible that two projects may be built, the Owyhee project, covering lands on the Owyhee River and crossing into Idaho territory, to be built by private interests; and the Malheur project, covering the Malheur and Willow River lands surrounding Weiser, Vale, and Ontario, to be built by the Government. The Reclamation Department has not signified its intention of abandoning the Malheur project in deference to private interests, but it may allow private interests to build the neighboring

project, as the two would reclaim a much larger territory than either alone.

"The outcome depends largely on the sentiment of the people, which, on the Owyhee, is for private irrigation, and in other parts of the territory emphatically for the Government project, as representing more permanent work."

❦ ❦ ❦

Governors Expected at Irrigation Congress

It is expected that on Governors' Day, August 13, chief executives will be in attendance from Idaho, Oregon, Montana, Utah, Nebraska, Wyoming, Colorado, Missouri, New York, Kansas, Texas, New Mexico, Kentucky, Florida, and other states.

Mr. Arthur Hooker, Secretary of Board of Control, is authority for the statement that at least twenty-five governors and most of the Western senators and congressmen will attend the sessions in Spokane the second week in August, when there will also be a number of railroad presidents, financiers, and experts who are interested in reclamation of arid and swamp lands, forestry, deep waterways, good roads, and home building. He says:

"This congress will be of vital interest to every state and territory in the Union, from the fact that the objects to be discussed affect them individually or collectively in one way or another. The presence of the governors and members of Congress in Spokane during the week of August 9 will afford an excellent opportunity for them to discuss many things of mutual interest. The presence of President Taft and members of his Cabinet at the irrigation congress will also influence a large gathering, and we look forward to entertaining a large number of delegates and visitors."

❦ ❦ ❦

Forestry in the Schools

Forestry is attracting wide attention among the schools of this country and Canada. * * * The public-school teachers say that they find in it a fascinating study for children, and one which, by furnishing much tangible material on which to work, develops the child's observation. Although the public schools of Iowa are in the vanguard of the movement, Connecticut schools are not so far behind, and as a text-book are using several of the public documents issued by the Forest Service, including Bulletin 173 as a primer of Forestry.—*Hartford* (Conn.) *Times.*

❦ ❦ ❦

Mr. Pinchot on Forestry in Arkansas

At a reception in Washington of the Arkansas Society to the Societies of the Mississippi, Missouri and Texas, on June 7, Mr. Pinchot said:

"Everywhere we have found that the Southern people appreciate and support the fundamental principles of the Forest Service, which is to put every piece of land to that use in which it will best serve the interests of the people of the country, whether that be a forest use, an agricultural use, or any other.

* * * * *

"The problems which these forests present are in many respects different from those of other National Forests. I do not, however, anticipate any serious difficulty in dealing with these conditions. The important problems are those connected with homestead and timber and stone entry, with grazing, and with control of fires and the related question of protecting the cattle from ticks.

"It has long been the habit of the Arkansas people to set fire to the dry grass and brush in these forests for the purpose of eradicating these ticks, and it is not improbable that the effort which the Forest Service has made to prevent these fires altogether was to some extent mistaken. A very careful study of the whole situation is now in progress. The Service has a strong desire to do justice to every man and to adapt its methods of administration, in every point, to local conditions. The support of the general policy of the Service in Arkansas appears to be thoroughly well established, but certain points of friction still remain. These we shall do our best to remove altogether during the coming summer."

❦ ❦ ❦

The Moral Aspect of Forestry

"Men do not go into the forestry profession to make money, to get rich, or to have an easy thing of it," said Gifford Pinchot, chief forester of the Government, during a recent address. "They go into it because they love hardiness, because they love the real things of life, and because they want to identify themselves with a movement that benefits not only their own generation, but generations to come.

"I have always held that a man cannot be a good forester without being a good citizen. He is working not merely for himself, or for his employer, or for his own generation, but for people he will never see, to better conditions he will never encounter. The essential fabric of his whole aspiration is foresight. And yet this quality of foresight he must temper with deliberation, in order that his results may fit conditions that are more or less elastic. Plans that have been made far in advance to fit a situation that ought, in the nature of things, to exist, sometimes have to be revised because that situation has unexpectedly changed.

"The principle of 'best use' enters to an important degree into the profession of forestry, by which is meant the using of a forest so that each particular factor of which it is

composed is brought to its fullest efficiency, not only for the present, but for the future. When you pass the idea of immediate use, regardless of consequences, and accept the doctrine of foresight, you come to the 'moral' aspect of forestry. That moral feature is the one on which Theodore Roosevelt said his whole administration was based—the assuring of equality of opportunity. With the forester it means that the man in the streets, the everyday American, shall get an equal share in that particular natural resource of his country."—*American Cultivator*, Boston, Mass.

Saving the Big Trees

Under the above heading, the *Lubec* (Me.) *Herald* says:

"One of the commendable acts of Congress was the passage of the Calaveras bigtree National Forest bill. The Calaveras grove is one of several in California that contain some of the largest and most remarkable tres in the world. A giant redwood would be dwarfed among these trees. They should be regarded as a splendid treasure for the entire country, and all of them should be preserved and guarded with the greatest care.

"There were some doubts about the right of the Government to make the purchase, but fortunately they were dispelled or had no effect except upon overcautious minds. The result is that everything that can be done will be done to protect the trees. There is no longer any danger that they may be cut down and sold for lumber; the Forestry Service will see that they are not injured by man and will take every precaution to save them from destruction by fire."

A New Pest

The *Peoria* (Ill.) *Star* says:

"Forty years ago a beetle was imported from South America and made its appearance in Baltimore. It attacked the foliage on the elm tree. Little by little, it has become a pest, and it has been slowly making its way westward. It has now appeared in the eastern counties in Indiana. The state entomologist of that commonwealth calls the attention of the public to the fact, and says that if the beetle is allowed to continue its work uninterruptedly, it will destroy all the elm trees of the state, and as these are the choicest shade trees we possess, it is highly incumbent upon us to look out for this new enemy. What with the timber thieves destroying the forests, the lumber ring controlling the wood-pulp output, and the bugs eating up our shade trees, our forests are in a bad way."

Michigan Forest Fires

Press dispatches of May 27 reported forest fires raging in the vicinity of Negaunee, Mich., resulting in the complete destruction of the town of Dalton. A special train took the people of the place to safety. Many fishing parties in the woods were in danger. There had been no rain in the vicinity for weeks.

Pursuing Timber Thieves in Michigan

Under Land Commissioner Russell and his men, firms of the upper section of the state who have been robbing state tax lands of timber with impunity are being brought up with a sharp turn and in many counties trespass on state lands to steal timber is suddenly becoming decidedly unpopular.

For one thing, the department has made a radical change in the manner of seeking trespassers and prosecuting them for their thievery. Since January this year, when Commissioner Russell assumed direction of the land department, ninety-eight cases of trespass have been investigated, which is a record unequaled for many years, it is said. The department has done away with the old plan of engaging as trespass agents local men, who either might be robbing the state themselves or who might be allowing their friends and neighbors to take the timber.

He has four general trespass agents out looking after timber thieves, and five examiners who are assisting in the work.

* * * * *

The policy of the department is said to be to enforce the statute regarding trespass and comparatively few adjustments are made. From the cases disposed of the state has received $1,790.04, and with other cases pending the amount will run to at least $2,200.84, received since January. From the reports of trespass agents it is shown that 429,771 feet of timber, 10,000 posts, 5,085 ties, and several hundred poles and mining props have been taken, which causes one to wonder how much was taken when the trespass agents were not so active.

A large portion of this stolen timber has been seized, the state mark placed thereon, and is held pending the settlement of the cases. Much of it will revert to the state and will net several thousand dollars in addition to what has been secured.

Of the twenty-two criminal cases started fourteen are now pending in circuit court, eight have been convicted, three are awaiting sentence, three have paid fines, and two are serving sentences, not a case having been lost so far.—*Grand Rapids* (Mich.) *Press*.

Forest Work in Virginia

Gov. Claude A. Swanson, of Virginia, is seeking to promote Forestry in the Old Dominion. In a letter dated June 3 to Mr.

Overton W. Price, associate forester, Governor Swanson says:

"I am deeply interested in encouraging the preservation of the present forests and the growth of new forests within this state. From observation it seems to me that this state, if properly and scientifically treated, would very rapidly reforest itself, much to the advantage of the entire state and to the profit of the owners of the soil. I am desirous of having a scientific examination to ascertain the best means of accomplishing this; the best places where the new forests should be permitted to grow; the best means of preserving them and suggestions as to general scientific treatment. I believe incalculable good could be done in this state if this subject was taken up in a broad and scientific way."

Arrangements have been made for cooperation between the state and the Forest Service. The governor will incorporate in his message to the general assembly suggestions of legislation looking to the end which he desires to see accomplished, and will strongly urge that attention be given to the matter by the lawmakers.

Afforestation by Newark

With a view of protecting its water supply and at the same time preserving its forests, the city of Newark is now spending considerable money and labor in forestry work at the Newark watershed at Charlottesburg and Oak Ridge. It may be fifty or sixty years before the city reaps a harvest from this sowing; that is, getting financial returns for the lumber to be derived from the forests, but in the meantime the miles of trees will aid in the preservation of the water in the watershed.

Since the nursery work was begun the assistant engineer and his force of men have planted 40,000 young trees and thousands more will be planted in the seed next fall.—*Paterson Guardian.*

Forestry Work in Vermont

Vermont is vigorously addressing herself to the forest question. At its last session the state legislature abolished the office of forestry commissioner and chose a board of agriculture and forestry, empowering it to secure a trained man to investigate conditions, promote reforestation on a scientific basis, and act as the state fire warden. The board selected as its first state forester Mr. A. F. Hawes. In 1903 Mr. Hawes was graduated from the Yale Forestry School and became state forester of Connecticut. He studied the forestry situation in France and Germany and, after some additional service in Connecticut, accepted the offer made him by Vermont.

Mr. Hawes figures that the total annual product of the forests of the Green Mountain state is worth $10,000,000, and that the total area of forest and waste lands is 3,719,000 acres, about sixty-four per cent of the total area of the state. Mr. Hawes says also that since 1880 the total lumber cut of the state has reached about 2,000,000,000 feet and that this amount has been drawn largely from the principal or capital, and not from the annual growth of the forests.

A campaign of education will be waged throughout the state, partly through public meetings held under the auspices of the board and partly through the bulletins which will be issued from time to time. By interesting the teachers in forest problems, it is hoped that they will talk up the subject in their schools, awaken the interest of the pupils therein, and cause them to become thoroughly alive to the forestry problems of the sate.

"One of the most important functions of the office of state forester," says Mr. Hawes, "is that of fire warden. The fire warden in each town is the local warden, and they are all under the direction of the state forester, who, with two assistants, will next summer make a thorough investigation throughout Vermont as to forest fires, causes, amount of damage, and means of protection.

"The state forester will cooperate with lumbermen and farmers desiring to improve their lands and prevent them from going to waste. * * * The best farmers, who are continually bringing up the productive capacity of their fields, have entirely overlooked the fact that their wood lots are producing only a small portion of the income which they could produce."

A Chair of Silviculture at Yale

The Yale Forest School in particular, and the cause of conservation in general, are to be congratulated upon the gift of $100,000 by Mrs. Morris K. Jesup for the establishment in that institution of a chair of silviculture, to be known as the Morris K. Jesup Professorship of Silviculture.

Because of the present unfortunate lack of authoritative, scientific information in regard to the reproduction, either natural or artificial, of American forests, of their growth, and of the best time and methods of cutting them, such an endowment as this by Mrs. Jesup will aid materially toward actual conservation of our wooded areas and the reforesting of those already laid waste.

Annual Meeting of Connecticut Forestry Association

The annual meeting of the Connecticut Forestry Association was held in May in West Hartford, with about fifty of the leading forestry men of the state in attendance. At the business meeting preceding the ad-

dresses these officers were elected for the coming year:

President—Prof. H. S. Green, director of the Yale Forestry School, New Haven.

Vice-presidents—Dr. E. H. Jenkins, of the New Haven Agricultural Experiment Station; Everett S. Geer, Hartford; Theodore L. Bristol, Ansonia.

Recording secretary—F. H. Stadtmueller, Elmwood.

Corresponding secretary — Miss Mary Winslow, Weatogue.

Treasurer—Alfred Spencer, jr., Hartford.

Auditor—Appleton R. Hillyer, Hartford.

Advisory board—The above officers and Mrs. Jessie B. Gerard, South Norwalk; George D. Seymour, and W. O. Filley, New Haven.

Publishing committee—Dr. E. H. Jenkins, Prof. H. S. Graves, and Miss Mary Winslow.

The constitution of the association was so changed that the annual meetings would be held on the first Saturday in May in place of the Saturday following Arbor Day, as heretofore. The report of the secretary showed a membership of 126, a gain of twenty members during the year. That of the treasurer showed a balance on hand of $132.09. At the morning session an address on "Forestry Legislation and Future Forest Policy in the State" was given by W. O. Filley, of New Haven, acting state forester. George Towne, of Union, also gave an address on "Fire Protection." At the afternoon session, which followed a basket-picnic lunch, Prof. J. W. Toumey of the Forestry School, Yale University, gave an address on "Forest Planting." The matters of fire protection and importance of adequate appropriation by the sate for the maintenance of the state forester, ex-officio fire warden, were emphasized. The feeling was unanimous that the present fire-warden law was fully adequate, if given a proper chance, which it has never had, owing to the lack of funds to put it into proper execution. A bill is before the present legislature to increase the appropriation of the state forester so that this matter can be rectified and a better system of forest conservation in this state begun.

Dry Farming

Two ways, thus far, of conquering the desert have been devised: First, irrigation; second, dry farming. At Billings, Mont., on October 26, 27 and 28, the fourth Dry-farming Congress will be held. Its secretary is John T. Burns, Billings, Mont., and it has issued an interesting bulletin.

Natural Resources to Produce Revenue

Representative Sheppard of Texas evidently is a believer that the Federal Government should resort to some other method of procuring revenue than by that of taxation. To make his ideas effective, if possible, he has introduced in the House a resolution for the creation of a commission to investigate and report at the earliest practicable moment on the method of utilizing the minerals, the timber, the water-power, the hot waters, and other resources of the public domain in such a manner as to make their production of the largest possible value to the Federal Government. The resolution provides that the commission shall consist of the Secretary of Agriculture, the Secretary of the Interior, the Director of the Geological Survey, one Senator, one Representative, and two business men.—*North Dakota Farmer.*

Face to Face With a Water-power Trust

Far-sighted captains of industry, realizing what the next generation will bring forth—reduction in the fuel supply with its complement, an enhancement of cost—and anticipating the advancement that will come in the art of utilizing hydro-electric power, have already seized advantageous points, and even now a small group of "interests" controls a third of the present water-power production; that is, produces power the equivalent of that proportionate part. * * * This, and preceding generations, have realized the significance of monopoly in those things which are vital factors in the lives of all consumers, whether it be heat, light, food products, or transportation. Yet all these united must be multiplied to be tantamount in power to the monopolistic Colossus which is yet but a suckling, nurturing itself at the breast of its foster-parent, the public. For heat, light, and transportation, and the power that turns the spindles and grinds the corn, will be the product of transmuted water-power within the lifetime of our children.—Charles Edward Wright, Assistant Attorney to the Secretary of the Interior, in the *Annals of the American Academy of Political and Social Science.*

The Water-power Monopoly

With more than forty water-power grab bills in Congress and predatory corporations grasping at every available water site in the country without recompense, President Taft is urged by Water-power Expert John L. Mathews, in the June *Hampton's*, to curb the growing power of what threatens to be a greater trust than Standard Oil. He declares, "A new monopoly more terrible than has ever threatened the country, paying nothing, demanding all, its members have gone to Congress and borne away perpetual franchises to the greatest of our last remaining resources. Only the determined stand of President Roosevelt and Forester Gifford Pinchot has so far come between them and victory."

It was the Rainy River Dam bill which President Roosevelt vetoed. Rainy River, a

broad, deep stream, forms the boundary for a considerable distance between Minnesota and Canada.

"For making paper, for milling in transit the wheat which passes through, there is not in the world a more favorably situated power. It is available in Canada and in America, on either side of the tariff wall," says Mr. Mathews.

"Congress and the state gave away all public rights in the fall. It happened that the company was restricted in the time allowed to build its dam, and when the time expired had made barely a beginning. The corporation owners asked and secured an extension of time from Congress, and this extension President Roosevelt vetoed. The bill was passed over his veto, but not until the company had executed a contract by which its grant expires in ninety-nine years, and in the meantime the Secretary of War may regulate the charges which it can make for power."

Of the so-called grab bills in Congress, it is asserted that "two great corporations, the Westinghouse and the General Electric, and other smaller corporations which are said to be subsidiaries of these two great companies, already control more than half of the most valuable water-power in the country—that which falls down from the Appalachians from the Potomac River southward to the Gulf. Many of the applicants for grants were dummies for the corporations, and it was evident that there was a "hurry-up" rush on foot to grab, before the people woke up, the greater part of the yet undeveloped power sites.

"Nor was the importance of this to be seen at once, or to be realized until first the President and then the people could be made to grasp the tremendous importance of water-power. For generations we had used it sparingly, turning with it no machinery which could not be reached from the water-spun turbine by a belt or shaft. Suddenly, in a wonderfully short time, we have entered and advanced far in a new series of inventions by which we are able to develop power at any fall, in the form of electricity, and carry it even hundreds of miles, with but slight loss, to be used for commercial purposes wherever needed. In ten years we will be sending power 1,000 miles, and the most remote mountain streams will be contributing to run our railways, to light our cities, to take the smoke from our factories, and even to do the ordinary work about our farms and homes—lighting, heating, plowing, milking, churning, ironing, cooking, and all that coal and animal power do now.

"There is in the United States developed and unharnessed in our rivers and brooks more than 50,000,000 horse-power in water capable of being turned into electrical energy and transmitted to homes, farms, and factories. This can perhaps be increased fifty or even 100 per cent by proper conservation. Yet even in the original figure it means the equivalent of 650,000,000 tons of coal every year mined, transported, and consumed; or, as we waste half of our coal in getting it from the ground, it represents the diminution of 1,000,000,300 tons in our available supply of coal.

"We actually mine and ship each year about 500,000,000 tons of coal. So the water-power, the bulk of which we are giving over to monopoly, represents more than the equivalent of all our coal; represents the only hope for cheap living; represents a fuel or source of power which, while controlled by the people, can be used for public income and for regulating costs; but which, when alienated as we are alienating it, will create a trust that will make of the meat trust a pigmy, and that by simply adding pennies to its charges for power will reduce us to a slavery which would make the Standard Oil magnates gasp with envy. Such a state of affairs would surely produce a revolution. Only sane and radical action can avoid such a contingency."—*The Wichita* (Kans.) *Eagle*, May 23, 1909.

Water-power Sites

Says a writer in the *Washington Times* of May 31:

"Apparently with a view to meeting the criticisms that have been bestowed on the Interior Department, more especially on Secretary Ballinger, by some of the friends of the movement for the conservation of natural resources, a statement has been issued from the United States Geological Survey explaining just what is being done with respect to the withdrawals of public lands from entry for the purpose of protecting water-power sites.

"Secretary Ballinger not long ago succeeded in drawing a fire of bitter attacks on the charge that he was hostile to conservation because he threw open to entry over a million acres of land which Secretary Garfield, to protect water-power sites, had withdrawn from entry.

"The statement of the Geological Survey sets forth that, in fact, there has been prompt action in protection of public interests. It says that, 'acting upon the specific instructions of the Secretary of the Interior, the United States Geological Survey has begun the investigation of water-power sites on the public lands. Since April 23, the date of the Secretary's order, the Director of the Survey has recommended eleven temporary withdrawals in aid of proposed legislation affecting the disposal of water-power sites on the public domain.'

"The withdrawals in question aggregate 236,365 acres of public lands in Utah, Colorado, Wyoming, Montana, Idaho, and Oregon, and have been approved by Secretary Ballinger. It is explained that the present policy is to protect the public by withdrawing all public lands containing possible power sites, and at the same time not withdrawing land of no value for power purposes. It is said by the Director of the Geological Survey the withdrawals made and such as will be made before the next regular session of Con-

gress, 'will be ample to protect all the more important water-power sites undisposed of on the public domain, and enable Congress to intelligently legislate for their disposition.'"

A Conservation Commission for Iowa

On June 7 Gov. B. F. Carroll named the first state drainage and conservation commission that Iowa ever had, in accordance with the law passed by the recent legislature setting aside $5,000 for preliminary steps toward making Iowa rivers navigable.

By people who are interested in improvement of Iowa waterways and the conservation of the state's natural resources, the creation of this board is regarded as the most important act of the legislature.—*Des Moines* (Iowa) *Capital.*

Favors a Conservation Commission for Canada

Hon. Clifford Sifton, who represented Canada at the International Conference on Resources in Washington, is now advocating the appointment of a Canadian commission to carry out the principles promulgated there. He is supported in his campaign by Hon. Sydney Fisher, one of the other Canadian delegates. In his first public address after returning from Washington Mr. Sifton, the other evening, asserted that the preservation of forests called most loudly for action. The creation of a commission, he believed, would give a minister support in carrying out a more aggressive policy.

Conservation of Daylight

Speaking of "the movement for the conservation of natural resources through the better utilization of daylight," the *Grand Rapids* (Mich.) *Herald* said editorially:

"The select committee of parliament which gave the pending British bill a unanimously favorable report, 'its advantages far outweighing any objections thereto,' cite among other such advantages these: Bunching the leisure, especially of wage-earners, at the end of the work day; bettering the health of all classes, and especially the eyesight; an enormous aggregate saving in expense for artificial light, and materially reduced consumption of liquors by reason of more outdoor daylight recreation and less resort to drinking places. It also appears from the report of the parliamentary committee that the principle of the measure has the support of the British chambers of commerce in all the principal cities; of the borough councils; of all the great railroads; of the general federation of trades unions; of the postoffice department with reference to the handling of all but the relatively small amount of continental mail; of the press—in fact, a support that is 'surprisingly unanimous in all quarters, considering the little favor with which the proposition was received by the public when the measure was first introduced.'"

Forest Fires in Maine

After all conversation, law, and expenditure, enormous tracts of forests in northern Maine are being destroyed by fire. The disaster involves farmers as well as lumbermen, for thousands of bushels of potatoes have been prematurely roasted to a cinder. On whom does the responsibility rest? Is not the carelessness of lumbermen and of hunters largely responsible for awful waste of forests? Is not the moral factor of American industry minimized by high finance and by the tainted conscience which characterizes not only the sugar trust, but many of us outsiders—rich and poor—concerned only for the present moment? Though we ignore Him, there may yet be a God in Israel. The first firebrand is the real devil.—*Lewiston* (Me.) *Journal.*

Bark Affects Penetration of Wood Preservatives

The Government has gone into the study of every phase of wood preservation. One of the features which has been neglected is the effect of patches of inner bark on wood in preventing proper penetration of preservatives.

In conducting some tests on the treatment of pine in Louisiana and Alabama, in 1907 and 1908, it was noticed that very little or no creosote entered the wood through even the thinnest layer of adhering bark.

In the creosote treatment of timbers, it is rare that the entire stick is penetrated by the preservative. The value of the treatment consists largely in the creation of an exterior antiseptic zone around the untreated interior portion. If this outer zone be broken the value of the treatment is to a large extent lost.

In the case of piling, the effect of any small portion of untreated wood extending from the outer surface to the interior of the pile is especially injurious, because of the manner in which teredoes work. This parasite enters the wood when small, making but a tiny hole, perhaps no larger than a pinhead. As teredoes grow, they increase the size of their borings, and, if present in large numbers, they will very quickly so riddle and weaken a pile that it will break off with a very slight strain. Access to the interior of a treated pile might readily be gained through small, untreated portions of the outer surface of the wood, which, because of bark adhering at time of treatment, absorbed no preservative, with the result that all of the interior untreated portion would be riddled, leaving only the exterior creosoted shell sound. It is probable that

many of the failures of creosoted piling are due to this cause.

With other forms of timber the effect may not be so quickly seen or so disastrous, but in a similar manner decay may extend to the interior through any untreated portions communicating with the exterior.

Government Studying Yellow Pine

A study of conditions in the yellow-pine forests of the Southwest, made during the past season by the United States Forest Service at the recently established Coconino Forest Experiment Station, has brought out very strikingly the difficulty of securing natural reproduction in this type of forest.

In northern Arizona, perhaps at least half of the forest is without young growth of any kind, and old cuttings are frequently barren wastes. The most important factors in bringing this about are the climate, fire, methods of cutting, disposal of brush, and grazing; in most cases two or more of these factors work together in preventing reproduction.

While the study has not yet been completed, the preliminary results are of great practical interest and value, and point to the methods of management which must be used in this type of forest. Light cuttings, disposal of the brush by lopping and scattering, and the exclusion of sheep until the cut-over areas have a satisfactory young growth, are recommended.

Magazines Pushing Conservation

The magazines are giving a good deal of space to the conservation question. *The Annals of the American Academy of Political and Social Science* for May and *The Chautauquan* for June are special conservation numbers, and worthy of careful study.

Vanishing Forest Giants

Says the *Waterbury* (Conn.) *Republican:*

"The lumbermen cut down a hemlock tree 455 years old in the Adirondacks near Utica the other day. It measured thirty-three inches in diameter at the butt. So slow is the growth of the few great trees that remain of the virgin forests of the East that this hemlock was forty years old when Columbus discovered America. Yet it was less than a yard in diameter. You can find in our ruined woodlands stumps of first-growth timber that was five or six feet in diameter when cut. There are old houses in Connecticut and Massachusetts in which you can see doors, a yard or so wide, that were sawed out of one board. It must have taken at least ten generations to grow such trees.

"Such timber is now found only on the Pacific coast. The Seattle Exposition management is boasting of a Forestry building with a colonnade of fir logs five feet in diameter. Indeed, the contract for the erection of the building reads that the wooden pillars should not exceed five feet in diameter, so that the contractor should not supply larger logs because they happened to come handier. But the Pacific coast will come sooner or later to our condition."

Wood-waste Distillation

As evidence of the growing interest in the distillation of wood-waste may be noted the establishment of a publication, "The Wood-waste Distilleries News," which first appeared in Cleveland, Ohio, in May. Its editor is Carl von Hartzfelt, M. C.

RECENT PUBLICATIONS

"The Principal Species of Wood: Their Characteristic Properties." By Charles H. Snow, Dean of the School of Applied Science, New York University.
Large 8vo, xvi+203 pages, figures in the text; 37 full-page half-tones. Cloth, $3.50. John Wiley & Sons, New York.

The second edition of "Principal Species of Wood," issued last year by Prof. Charles H. Snow, of New York University, will be gladly welcomed by those who are familiar with the first edition, and should prove of interest and value to wood users in general. The new edition keeps the same arrangement and discusses the characteristics of the different species in the same way as the first, but the typographical errors present in the first edition have been corrected and the whole book slightly enlarged. Considerable additional material is contained in the introduction, in which the author takes up more fully the structure and uses of wood, the life of trees, and discusses briefly the subject of forestry. The misspelling of "humis" for "humus" is unfortunate, but the material contained in the discussion of this and related topics is trustworthy.

The book is intended chiefly for engineers and for those who are interested in the structural properties of timber; but, in spite of its technical character, contains much material of interest to the general reader. It is attractively published and contains a great deal of valuable information regarding the different species of American woods which has never before been brought together in such available form.

S. T. D.

Timber and Coal Lands for Sale

7,100 acres in North Carolina
9,000 acres in Tennessee
24,000 acres in Tennessee
51,000 acres in Tennessee
23,000 acres in Georgia
50,000 acres in Mississippi
13,000 acres in West Virginia
25,000 acres in Virginia

Many other tracts
Titles good
Prices reasonable
Tell us what you want

TRI-STATE INVESTMENT & SECURITY CO.

Union Trust Building
Parkersburg, West Virginia

FOREST MENSURATION
Graves

8vo, xiv + 458 pages, 47 figures. Cloth, $4.00.

THE LONGLEAF PINE IN VIRGIN FOREST
Schwarz

12mo, x + 135 pages, 23 full-page half-tone illustrations and 3 diagrams. Cloth, $1.25 net.

PRINCIPLES OF AMERICAN FORESTRY
Green

12mo, xiii + 334 pages, 73 figures, including many half-tones. Cloth, $1.50.

JOHN WILEY & SONS
43 and 45 East 19th St., New York City

The Campion McClellan Co.
Incorporated
ENGINEERING, CONSTRUCTION
POWER, INDUSTRIAL, RAILWAY
90 West Street - - - New York
1003 Bailey Building - Philadelphia

For a space this size the cost is small and the field is large. Try us. Conservation, Washington, D. C.

PUMPS WATER
Day and Night Automatically

Low in first cost, easy to install, no expense to operate, any capacity desired for Country Homes, Farms, Dairies, Gardens, Irrigation, Town Plants, Railroad Tanks, etc.

RIFE HYDRAULIC RAMS

Raise water 30 feet for every foot of fall. Satisfaction Guaranteed. Over 7,000 in use. If there is a stream, spring or pond within a mile—

Write for Free Plans and Book.
Get Our Free Trial Offer.

Rife Engine Co.
2172 Trinity Bldg.
NEW YORK

Philippine Bureau of Forestry

WANTED—Two foresters with field experience. Minimum salary, $1,600. Travel expenses allowed, also liberal leave privileges.

At least seven months' interesting field work per year.

For information concerning travel allowance to Manila, Civil Service rules, health conditions; in fact any information in regard to the Islands, apply to the **Bureau of Insular Affairs**, War Department, Washington, D. C.

Orchids Orchids

We are specialists in **Orchids**, we collect, import, grow, sell, and export this class of plants exclusively.

Our illustrated and descriptive catalogue of Orchids may be had on application. Also special lists of freshly imported unestablished Orchids.

Orchid Growers and Importers

LAGER & HURRELL
SUMMIT, N. J.

NORTH CAROLINA

TIMBER INVESTMENT

Best small tract hardwoods in Western North Carolina — Price $5,500; will double in three years. Near new railroad. Yield, title, and location guaranteed.

C. A. DEVINE, Franklin, N. C.

VIRGINIA

TWO TIMBER BARGAINS

No. 45.—14,000 acres, iron and timber land, in Bath and Rockbridge Counties, Va. Second-growth timber, some merchantable; land lies well and is good grazing land for sheep or cattle. $1.25 per acre.

No. 46.—41,576 acres in Bath, Highland and Augusta Counties, Va. *Best virgin tract of white oak now standing in Virginia.* All easy logging proposition, 10 to 12 miles from C. & O. Ry. Road would have a water grade on Mill Creek—all easy grades. 160,000,000 feet saw timber, *75 per cent. of which is white oak of finest quality*, besides tan bark, ties and other timber. Owner would consider offer of $8.00 per acre.

Prospective Investors, Look This Over!

J. W. Guinn, Goshen, Virginia

Timber Lands, Farms and Summer Resorts

FOR SALE

300 acres, Loudoun County blue-grass farm, five minutes walk from railroad station at Leesburg; 2 fine houses, one of 14 rooms, all modern improvements, furnace heat, slate roof. Cost $18,000 to build, the other house has 8 rooms, porches, and fine barns and out-buildings, all in first-class condition. Price, $45,000. No. 2—328 acres. Genuine lime-stone blue-grass land. Which is the old home of Admiral Chilton, who was one of the founders of the U. S. Navy. It has a nice house of 13 rooms, and all kinds of out-buildings in first-class condition, all nicely fenced. The water supply is never failing. This farm has been pronounced by the U. S. Government as the best agricultural land in the state for blue-grass and grain. Price $21,000. Terms, to suit purchaser.

Bulletin sent on application.

J. W. BAUCKMAN & SON

Real Estate Brokers Herndon, Va.

Summer homes, hunting preserves, and farms, in Old Virginia. Write,

W. E. LAWSON

Hampton, Va.

PENNSYLVANIA

Beautiful Country Home

Ninety-seven acres located southwest of North Wales on Walnut Street ¾ mile from the Station. The improvements consist of a fine stone mansion, and a large tenant house built of stone. Large stone and frame barn, and all outbuildings, spring and spring house, with ram forcing water to the house and barn. Fine stream of water flows through the farm. Fine meadow pasture. All buildings and fences are in order. All crops, stock and implements go with the farm.

Price of this splendid farm is only $23,000.

This is one of the finest farms in this section of the country, and cost the owner more than the price asked.

WM. J. WEATON

Farm and Timber Lands Mortgages Negotiated Estates Managed

49 North Thirteenth Street

PHILADELPHIA

Philadelphia Farm Agency

WE represent 800 owners of farms near Philadelphia; where farms are cheaper and markets are better than near any large city in this country. I can sell a good 50-acre farm for $2,500 to $4,000. Write and tell us your requirements; we have the properties.

E. H. TRENCHARD, Farm Specialist

1230 Arch Street, Philadelphia, Pa.

OKLAHOMA

OKLAHOMA REAL ESTATE

Farm lands, oil lands, coal lands. 2,000 acres tested coal lands, with 6 to 8 million ft. pine and oak virgin timber, $45 per acre.

Town and city property. Write for wants

Porum Realty Co., Porum, Okla.

VIRGINIA INVESTMENTS

J. NELSON GARNETT, Real Estate and Loan Agent, CULPEPER, VA.

50 to 100 Per Cent. Investments a Possibility

Choicest homes, investments of every description in Northern or Piedmont Virginia, the garden spot of the world, and the booming Southland, within sixty miles of Washington.

Write for property list and other information.

To the Members:

Your Board of Directors conclude their last annual report with the following:

"Inland navigation, deeper waterways, water powers, and economical manufacturing therewith, floods, soils, irrigation, drainage and the public health, as shown in detail by one of our folders, are all fundamentally dependent upon and related to Forestry. This larger field of conservation and utilization of all our natural resources plainly places upon our Association duties which should be heartily assumed, and diligently discharged.

"In closing, it should be said that, in comparison with the work remaining to be done, the work already accomplished by all the forestry forces combined is slight. Destruction of resources proceeds without abatement. Sentiment now developing should be intensified, and focused upon local, state and national governments, that legislation and administration may accomplish the ends without which all our efforts are vain.

"The American Forestry Association is a leading agency for general propaganda in this field. Its efforts are strictly limited by its means. Where it receives hundreds, it should receive thousands of dollars for the prosecution of the great work before it. For this arm of power it looks to its members. Their dues are practically its only resource. Each member may, however, enlist other members, and by so doing, render to his country a patriotic economic service of great value."

Use blank on the following page and enlist another member

Join the American Forestry Association

Filling and mailing the enclosed form:

I hereby signify my desire to become a member { Annual / Sustaining / Life } of the American Forestry Association.

Very truly yours,

Name.....

P. O. Address.....

DUES:

I. Annual: For Annual Members, $2. For Sustaining Members, $25.

II. Total, with exemption from all further payments: For Life Members, $100. For Patrons, $1,000.

Draw check to the order of the American Forestry Association

Membership coincides with the calendar year

S. A.

Nominations for Membership

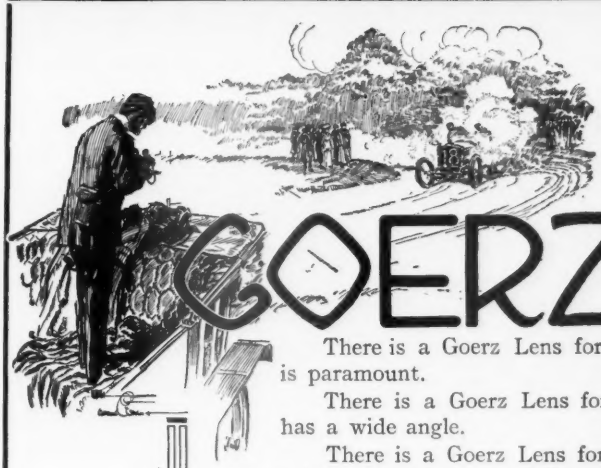
The activities of the National Office of the American Forestry Association are limited chiefly by its resources. These are derived almost wholly from its members in the form of dues. Every member is urged to aid in increasing the membership. Kindly fill out the enclosed blank form, lengthening the list, where possible, by attaching and filling blank sheet. The list should then be sent to

OTTO LUEBKERT
Secretary American Forestry Association
1417 G Street Northwest, Washington, D. C.

I hereby nominate the following persons for membership in The American Forestry Association:

Name	***Address***
.....	.....
.....	.....
.....	.....
.....	.....

Signed .....



Your dealer can equip your Camera with the Goerz Lens whether it is a Seneca, Century, Ansco, Premo or any Kodak

GOERZ DAGOR LENSES

There is a Goerz Lens for work in which quickness is paramount.

There is a Goerz Lens for sharp detail work which has a wide angle.

There is a Goerz Lens for long-distance work which brings the object especially near.

Enough of each of these three qualities is combined in the Goerz Dagor to make it the best all-around lens for the man who doesn't wish to specialize but who wants one lens capable of the widest range of work.

Everyone who wishes to do really serious and good photographic work should insist on having his camera equipped with the Goerz Dagor. Any dealer in cameras or optical goods has, or can get, the Dagor. Our free catalogue, sent on request, describes Goerz Lenses, the XL Sector Shutter (quick, smooth, compact and accurate), Trieder Binoculars (small in size, yet powerful) and Anschutz Cameras.

C. P. GOERZ AMERICAN OPTICAL CO., Office and Factory: 79 East 130th Street, New York

Dealers' Distributing Agencies: In Chicago—Jackson & Semmelmeyer; San Francisco—Hirsch & Kaiser; In Canada—R. F. Smith, Montreal.

The World's Greatest Poultry Paper

THE FEATHER

Only 50 Cents a Year

THE FEATHER'S LIBRARY

No. 1. **DISEASES OF POULTRY.** By D. E. Salmon, D.V.M. Fully illustrated. Paper, 50 cents; cloth, $1.

No. 2. **THE FEATHER'S UP-TO-DATE POULTRY HOUSE.** Paper, 25 cents.

No. 3. **THE AMERICAN FANCIER'S POULTRY BOOK.** Profusely illustrated. By Geo. E. Howard. Paper, 50 cents; cloth, $1.

No. 4. **PLYMOUTH ROCKS.** Colored illustrations. By T. F. McGrew. Paper, 50 cents; cloth, $1.

No. 5. **WYANDOTTES.** Colored illustrations. By T. F. McGrew. Paper, 50 cents; cloth, $1.

No. 6. **POCKET-MONEY POULTRY.** By Myra V. Norys. Paper, 50 cents; cloth, $1.

No. 7. **THE EGG QUESTION SOLVED.** By T. F. McGrew. Paper, 25 cents; cloth, 50 cents.

No. 8. **HOW TO GROW CHICKS.** By T. F. McGrew. Paper, 25 cents; cloth, 50 cents.

No. 9. **THE HOMING PIGEON.** Illustrated. Paper, 25 cents; cloth, 50 cents.

No. 10. **THE FEATHER'S PRACTICAL PIGEON BOOK.** By J. C. Long. Paper, 50 cents; cloth, $1.

No. 11. **MONEY IN SQUABS.** Profusely illustrated. By J. C. Long and G. H. Brinton. Paper, 50 cents; cloth, $1.

No. 12. **THE FEATHER'S PRACTICAL SQUAB BOOK.** By W. E. Rice. Paper, 50 cents; cloth, $1.

No. 13. **PERFECTED POULTRY OF AMERICA.** By T. F. McGrew and Geo. E. Howard. Illustrated by Louis P. Graham. Cloth, $2.50.

SPECIAL OFFER

Our latest book, **THE PERFECTED POULTRY OF AMERICA**, and **THE FEATHER** for one year for the price of the book alone, $2.50.

THE HOWARD PUBLISHING CO.

714 Twelfth Street Northwest Washington, D. C.

TREES FOR FORESTRY PLANTING

Catalpa Speciosa, Black, Locust, European Larch, Sugar or Hard Maple, American Beech, White Birch, Red Oak, American Linden, White Elm, American Sweet Chestnut, Black Walnut; also SEEDS of above varieties.

EVERGREENS

White Pine, Scotch Pine, Ponderosa Pine, Jack Pine, Austrian Pine, White, Norway, Douglas, and Red Spruce, $3.00 to $10.00 per 1,000. We also carry a large assortment of EVERGREEN Tree Seeds, both native and foreign.

Many Millions to Offer

We make a specialty of growing EVERGREENS and DECIDUOUS tree seedlings in immense quantities for reforestation purposes. Our list includes all valuable native species, at lowest possible prices. Our new Catalog describes each variety and gives much valuable information about care and culture.

All applicants for Catalog mentioning this Magazine will receive free of charge a booklet entitled "Catalpa Growing for Profit," by D. Hill.

D. HILL

EVERGREEN SPECIALIST

BOX 305 DUNDEE, ILL.

Hill's trees have been famous for over half a century.

In writing to advertisers kindly mention CONSERVATION

JAMES D. LACEY WOOD BEAL VICTOR THRANE

ARE YOU

Interested in Southern or Pacific Coast Timber?

We furnish detailed reports as to the **QUALITY** of the timber, giving average **TOP** and **BUTT** diameters, average lengths and number of trees on each 40-acre subdivision.

We submit reports covering details as to logging conditions, cost and most feasible methods of logging each 40-acre or sectional subdivision of each tract.

We also furnish a **TOPOGRAPHICAL** map of all tracts located in mountainous districts, showing every elevation of 100 feet throughout the tract with **OUR OWN** engineer's report showing locations of most feasible routes and grades for logging roads.

We can furnish sufficient data regarding **ANY** tract of timber which we have examined to convince you whether the tract is what you want or not. Personal inspection of any tract we may offer you will be found just as represented.

We are in a position to offer some exceedingly attractive **TIMBER** properties in the **SOUTH**, in **BRITISH COLUMBIA**, and on the **PACIFIC COAST**. Also a few going mill operations with ample timber supplies in South Carolina and Mississippi.

We furnish detailed reports of amount of **STUMPAGE** on each 2 1-2- 5- or 10-acre subdivision of each forty.

We employ expert **PACIFIC COAST CRUISERS** to check all estimates made on Western Timber.

We offer **HIGH CLASS** Timber Properties only, which have been placed in our hands for sale.

We guarantee our estimates are reliable.

JAMES D. LACEY & CO.

(ESTABLISHED SINCE 1880)

608 Hennen Building	828 Chamber of Commerce	507 Lumber Exchange	1215 Old Colony
New Orleans	**Portland, Ore.**	**Seattle**	**Chicago**

GEO. E. HOWARD PRESS, WASHINGTON